PHILOSOPHICAL TRANSACTIONS,

GIVING SOME

ACCOUNT

OF THE

Preſent Undertakings, Studies, *and* Labours,

OF THE

INGENIOUS,

IN MANY

Conſiderable Parts of the WORLD.

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PHILOSOPHICAL

TRANSACTIONS,

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ACCOUNT

OF THE

Jos: Banks

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PHILOSOPHICAL TRANSACTIONS.

The CONTENTS.

VOL. XLIX. PART II.

LX. *An Account of Four undeſcribed Fiſhes of* Aleppo; *in a Letter to Mr.* Peter Collinſon, *F. R. S. by* Alexander Ruſſel, *M. D.* Page 445.

LXI. *An Account of a curious, fleſhy, coral-like Subſtance; in a Letter to Mr.* Peter Collinſon, *F. R. S. from Dr.* John Albert Schloſſer, *M. D. F. R. S. with ſome Obſervations on it communicated to Mr.* Collinſon *by Mr.* John Ellis, *F. R. S.* p. 449.

LXII. *Two ſingular Caſes of diſeaſed Knee-joints ſucceſsfully treated: the firſt by topical Applications; the ſecond by Operation. By Mr.* Joſeph Warner, *F. R. S. Surgeon of* Guy's-Hoſpital. p. 452.

LXIII. *Extract of Letter from Mr.* William Pye, *dated* Manilla, Oct. 1*ſt*, 1754, *to his Brother in* London. *Communicated to Mr.* Benj. Wilſon, *F. R. S. by the Hon. Mr.* Barrington. p. 458.

LXIV. *An Eſſay on the Waters of the* Holy Well *at* Malvern, Worceſterſhire. *By* J. Wall, *M. D. Communicated by the Rev.* Charles Lyttleton, *L. L. D. Dean of* Exeter, *F. R. S.* p. 459.

CONTENTS.

LXIV. *An Account of the Case of a Man, who died of the Effects of the Fire at* Eddy-stone Light-house. *By Mr.* Edward Spry, *Surgeon at* Plymouth. p. 477.

A Letter to the Right Hon. George *Earl of* Macclesfield, *President of the* Royal Society, *concerning the same.* p. 480.

A Letter of John Huxham, *M. D. F. R. S. to Mr.* William Watson, *F. R. S. concerning the Case of the Man, who swallowed melted Lead.* p. 483.

LXV. *A farther Account of the Success of some Experiments of injecting Claret,* &c. *into the Abdomen, after Cupping. By Mr.* Christopher Warrick. p. 485.

LXVI. *An Account of the late Discoveries of Antiquities at* Herculaneum, *&c. in Two Letters from* Camillo Paderni, *Keeper of the Musæum* Herculanei, *to* Thomas Hollis, *Esq; Translated from the* Italian *by* Robert Watson, *M. D. F. R. S.* p. 490.

LXVII. *An Account of the Earthquake felt at* Glasgow *and* Dumbarton; *also of a Shower of Dust falling on a Ship between* Sherland *and* Iceland; *in a Letter from Dr.* Robert Whytt, *Professor of Medicine in the University of* Edinburgh, *to* John Pringle, *M. D. F. R. S.* p. 509.

LXVIII. *Extract of a Letter from Mons.* Bonnet, *F. R. S. to Mr.* Trembley, *F. R. S. dated at* Geneva, 30 January 1756, *concerning the Earthquake on the 14th of* November, 1755, *in* Valais *in* Swisserland. *Translated from the* French. p. 511.

LXIX. *Extract of a Letter from Mons.* Allamand, *Professor*

Professor of Natural Philosophy at Leyden, *and F. R. S. to Mr.* Trembley, *F. R. S. Translated from the* French. p. 512.

LXX. *An Account of some* Fungitæ *and other curious coralloid fossil Bodies; by* Thomas Pennant, *Esq*; *Communicated by Mr.* Henry Baker, *F. R. S.* p. 513.

LXXI. *An Account of Inoculation by Sir* Hans Sloane, *Bart. given to Mr.* Ranby, *to be published,* Anno 1736. *Communicated by the Rev.* Thomas Birch, *D. D. Secret. R. S.* p. 516.

LXXII. *Extract of a Letter from Dr.* John Stevenson, *Physician at* Edinburgh, *to* John Pringle, *M. D. F. R. S. dated* Edinburgh, 17 Feb. 1756, *with an Account of an extraordinary Agitation of the Water in a small Lake at* Closeburn, *in the Shire of* Dumfries; *by Sir* Thomas Kilpatrick, *of* Closeburn, *Bart.* p. 521.

LXXIII. *Accounts of the Irregularities of the Tides at* Chatham, Sheerness, Woolwich, *and* Deptford, *in* Feb. 1756. *Communicated by the Rt. Hon.* George *Lord* Anson, *F. R. S.* p. 523.

LXXIV. *Accounts of the Irregularities of the Tides in the River* Thames, *on the 12th and 13th of* February, 1756. *Communicated by* Robert Dingley, *Esq*; *F. R. S.* p. 530.

LXXV. *Thoughts on the Reverend Dr.* Hales's *new Method of Distillation by the united Force of Air and Fire. By* William Brownrigg, *M. D. F. R. S.* p. 534.

LXXVI. *Extract of a Letter to the Rev. Dr.* Hales, *F. R. S. from Governor* Belcher's *Lady; dated* Elizabeth-town, New-Jersey, Oct. 22, 1755;

1755; *concerning an extraordinary Motion in the Waters in the Lake* Ontario *in* North-America. p. 544.

LXXVII. *An Extract of a Letter from Monſ.* Groveſtins, *Maſter of the Horſe to his R. H. the Prince of* Orange, *Lieutenant-General, Commandant of the Forces, concerning an Earthquake felt by himſelf at the* Hague, *on* Wedneſday *the* 18*th of* Feb. 1756. *Tranſlated from the* French, *and communicated by the Rev.* William Parker, *D. D. F. R. S.* p. 544.

LXXVIII. *An Account of an Earthquake felt in* Holland, Feb. 18, 1756; *in a Letter from Monſ.* Allamand, *Profeſſor of Natural Philoſophy at* Leyden, *and F. R. S. to Mr.* Trembley, *F. R. S. Dated at* Leyden, Feb. 27, 1756. *Tranſlated from the* French. p. 545.

LXXIX. *An Account of the Earthquakes felt at* Bruſſels; *in a Letter from* John Pringle, *M. D. F. R. S. to* Thomas Birch, *D. D. F. R. S.* p. 546.

LXXX. *An Account of the Sinking of a River near* Pontypool *in* Monmouthſhire; *in a Letter from Mr.* Edward Matthews, *to the Commiſſioners of the Exciſe.* p. 547.

LXXXI. *An Account of the Agitation of the Waters, on the* 1*ſt of* November 1755, *in* Scotland *and at* Hamburgh. *Communicated by* John Pringle, *M. D. F. R. S. in a Letter to* Thomas Birch, *D. D. Secret. R. S.* p. 550.

LXXXII. *Microſcopical Obſervations: In a Letter from* Edward Wright, *Eſq; to Mr.* Peter Collinſon, *F. R. S. dated at* Paris, December 26, 1755. p. 553.

LXXXIII

CONTENTS.

LXXXIII. *An Account of a Cure of a paralytic Arm, by Electricity: In a Letter from* Cheney Hart, *M. D. to Mr.* William Watſon, *F. R. S.* p. 558.

LXXXIV. *Obſervations made upon the* Brimſtone-Hill *(in* French La Souffriere) *in the Iſland of* Guadelupa; *by* John Andrew Peyſſonnel, *M. D. Member of the Royal Academies of Sciences of* Paris *and* Montpelier, *and of* Marſeilles *and* Rouen; *the King of* France's *Phyſician and Botaniſt heretofore on the Coaſt of* Barbary, *and now in the Iſland of* Guadelupa, *F. R. S. Tranſlated from the* French *by* M. Maty, *M. D. and F. R. S.* p. 564.

LXXXVI. *Account of the Earthquake, felt* February 18, *along the Coaſt of* England, *between* Margate *and* Dover, *in a Letter from Mr.* Samuel Warren, *Superviſor of Exciſe, to* John Windham Bowyer, *Eſq; one of his Majeſty's Commiſſioners of Exciſe. Communicated by* John Pringle, *M. D. F. R. S.* p. 579.

LXXXVII. *Remarks on the Stones, in the Country of* Naſſau, *and the Territories of* Treves *and* Colen, *reſembling thoſe of the* Giants Cauſey *in* Ireland. *In a Letter to* Thomas Birch, *D. D. Secret. R. S. from Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* French. p. 581.

LXXXVIII. *An Account of a Work publiſhed in* Italian *by* Vitaliano Donati, *M. D. containing*, An Eſſay towards a Natural Hiſtory of the Adriatic Sea: *By Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* French, *by* Thomas Birch, *D. D. Secr. R. S.* p. 585.

LXXXIX.

CONTENTS.

LXXXIX. *A Diſſertation upon a* Parthian *Coin, with Characters on the Reverſe reſembling thoſe of the* Palmyrenes. *In a Letter from the Rev.* John Swinton, *M. A. of* Chriſt-Church, Oxon. *F. R. S. to the Rev.* Thomas Birch, *D. D. Secret. R. S.* p. 593.

XC. *A Catalogue of the* Fifty Plants *from* Chelſea Garden, *preſented to the* Royal Society, *by the worſhipful Company of Apothecaries, for the Year* 1755, *purſuant to the Direction of Sir* Hans Sloane, *Baronet, Med. Reg. & Soc. Reg. nuper Præſes, by* John Wilmer, *M. D. clariſſ. Societatis Pharmaceut.* Lond. *Socius, Hort.* Chelſ. *Præfectus & Prælector Botan.* p. 607.

XCI. *Extract of a Letter from Dr.* Vitaliano Donati, *Profeſſor of Botany at* Turin, *to Mr.* Abraham Trembley, *F. R. S. concerning the Earthquakes felt at* Turin, December 9, 1755, *and* March 8, 1756. *Tranſlated from the* Italian. p. 612.

XCII. *An Account of a continued Succeſſion of Earthquake at* Brigue *in* Valais. *Written by the Rector of the College of Jeſuits at* Brigue, *and addreſſed to Monſ.* Jalabert, *Profeſſor of Philoſophy and Mathematics at* Geneva, *and F. R. S. and communicated by Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* Latin. p. 616.

XCIII. *Extract of a Letter of Monſ.* la Condamine, *F. R. S. to Dr.* Maty, *F. R. S. tranſlated from the* French. p. 622.

XCIV. *Obſervations upon the Currents of the Sea, at the* Antilles *of* America: *By Dr.* Peyſſonnel, *F. R. S.* p. 624.

XCV.

CONTENTS.

XCV. *An Account of* Lacerta (Crocodilus) ventre marſupio donato, faucibus Merganſeris roſtrum æmulantibus. *By Mr.* George Edwards, *Librarian to the College of Phyſicians.* p. 639.

XCVI. *An Account of an unuſual Agitation of the Sea, at* Ildſarcombe, *in* Devonſhire, Feb. 27, 1756. *By the Rev. Mr.* Prince, *of* Barnſtable. *Communicated by the Rev.* Jeremiah Milles, *D. D. F. R. S.* p. 642.

XCVII. *Extract of a Letter from the Rev. Mr.* Holdſworth, *at* Dartmouth, *relating to the Agitation of the Waters obſerved there on the 1ſt of* November, 1755. *Communicated by the Rev.* Jeremiah Milles, *D. D. F. R. S.* p. 643.

XCVIII. *An Account of a Method of obſerving the wonderful Configuration of the ſmalleſt ſhining Particles of Snow, with ſeveral Figures of them: By* John Nettis, *Doctor of Phyſic, and Oculiſt to the Republic of* Middleburg, *&c. Tranſlated from the* Latiu. p. 644.

XCIX. *An Account of the Copper-ſprings lately diſcovered in* Pennſylvania: *By* John Rutty, *M. D. of* Dublin. *Communicated by Mr.* Peter Collinſon, *F. R. S.* p. 648.

C. *Extract of a Letter from the Abbé* Mazeas, *F. R. S. concerning an ancient Method of Painting, revived by Count* Caylus. *Tranſlated from the* French *by* James Parſons, *M. D. F. R. S.* p. 652.

CI. *Obſervations on the Abbé* Mazeas's *Letter on the Count* de Caylus's *Method of imitating the ancient Painting in burnt Wax: By* James Parſons, *M. D. F. R. S.* p. 655.

CII. *An*

CONTENTS.

CII. *An Account of the late Earthquakes felt at* Maeſtricht; *in a Letter from Monſ.* Vernede, *Paſtor of the* Wallon *Church there, to Monſ.* Allemand, *Profeſſor of Philoſophy at* Leyden, *F. R. S. Communicated by Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* French. p. 663.

CIII. *An Account of the Agitation of the Sea at* Antigua, Nov. 1, 1755. *By Capt.* Affleck *of the* Advice *Man of War. Communicated by* Charles Gray, *Eſq; F. R. S. in a Letter to Mr.* William Watſon, *F. R. S.* p. 668.

CIV. *An Account of a remarkable Foſſil, in a Letter from* Edward Wright, *M. D. to Mr.* Peter Collinſon, *F. R. S.* p. 670.

CV. *An Account of the* Orthoceratites: *In a Letter from* Edward Wright, *M. D. to Mr.* Peter Collinſon, *F. R. S.* p. 672.

CVI. *A Retractation, by Mr.* Benjamin Wilſon, *F. R. S. of his former Opinion, concerning the Explication of the* Leyden *Experiment.* p. 682.

CVII. *An Account of the extraordinary Agitation of the Waters in ſeveral Ponds in* Hertfordſhire: *In a Letter from the Rev.* Thomas Rutherforth, *D. D. F. R. S. to the Rev.* Samuel Squire, *D. D. F. R. S.* p. 684.

CVIII. *Some Conſiderations on a draught of two large pieces of Lead, with* Roman *Inſcriptions upon them, found ſeveral years ſince in* Yorkſhire. *By* John Ward, *LL. D. Rhet. Prof.* Greſh. *and V. P. R. S.* p. 686.

CIX. *Two Eſſays addreſſed to the Rev.* James Bradley,

CONTENTS.

Bradley, *D. D. and Aſtronom. Reg. by Mr.* Charles Walmeſley, *F. R. S.* p. 700.

CX. *A Journal of the Weather in* Dublin *for the Year* 1753; *by Mr.* James Simon, *F. R. S. and S. A.* p. 759.

CXI. *An Account of what happened at* Bergemoletto, *by the tumbling down of vaſt Heaps of Snow from the Mountains there, on* March 19, 1755: *As taken by the Intendant of the Town and Province of* Cuneo. *Received from Dr.* Joſeph Bruni, *Profeſſor of Philoſophy at* Turin, *and F. R. S. Communicated by Mr.* Henry Baker, *F. R. S. Tranſlated from the* Italian. p. 796.

CXII. *An Account of ſome of the more rare* Engliſh *Plants obſerved in* Leiceſterſhire. p. 803.

* CXII. *A Letter from Mr.* John Ellis, *F. R. S. to* Philip Carteret Webb, *Eſq*; *F. R. S. attempting to aſcertain the Tree that yields the common Varniſh uſed in* China *and* Japan; *to promote its Propagation in our* American *Colonies*; *and to ſet right ſome Miſtakes Botaniſts appear to have entertained concerning it.* p. 806.

CXIII. *A Letter to* George Lewis Scott, *Eſquire, concerning the preſent Increaſe of the People in* Britain *and* Ireland: *From* William Brakenridge, *D. D. Rector of* St. Michael Baſſiſhaw, London, *and F. R. S.* p. 877.

CXIV. *A Letter to the Reverend* William Brakenridge, *D. D. Rector of* St. Michael Baſſiſhaw, *and F. R. S. with a Table of the Value of Annuities on Lives, by Mr.* James Dodſon, *Maſter of the Royal Mathematical School in* Chriſt's-Hoſpital, *and F. R. S.* p. 891.

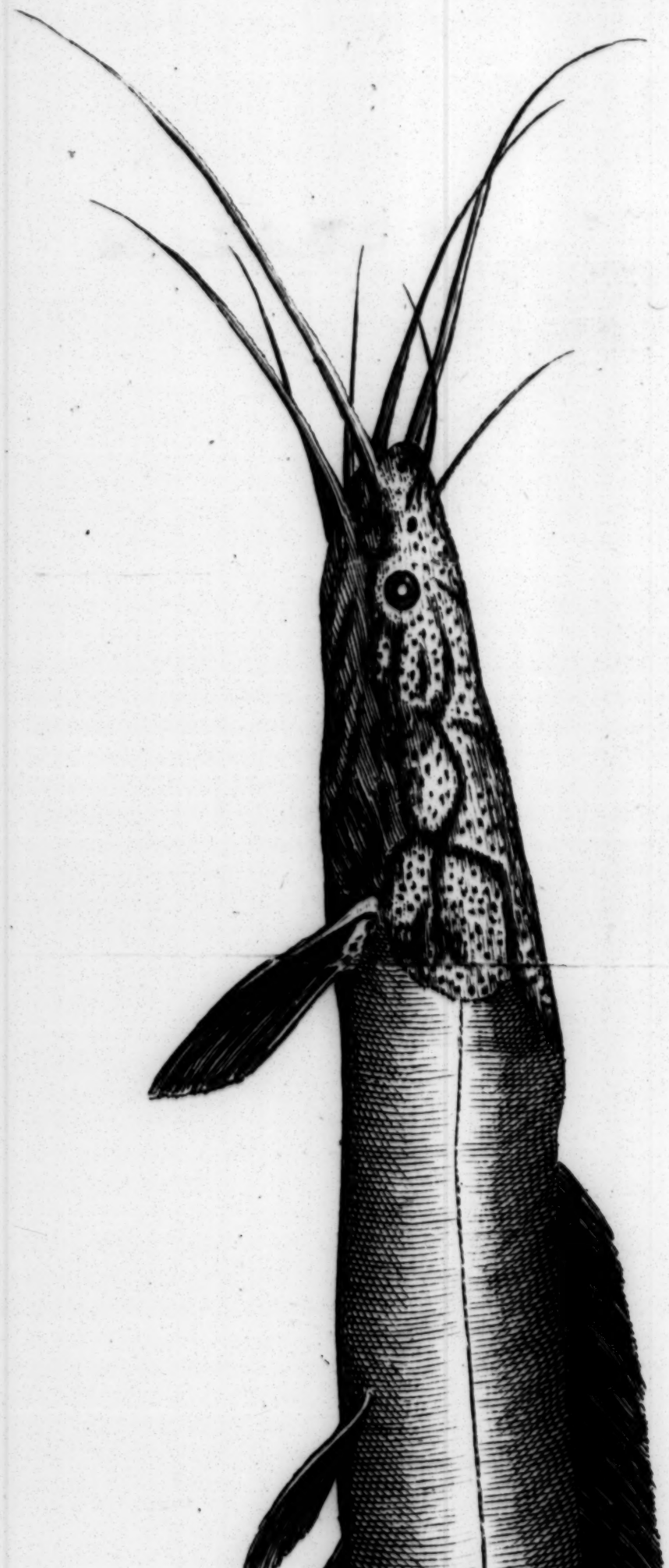
CXV. *An*

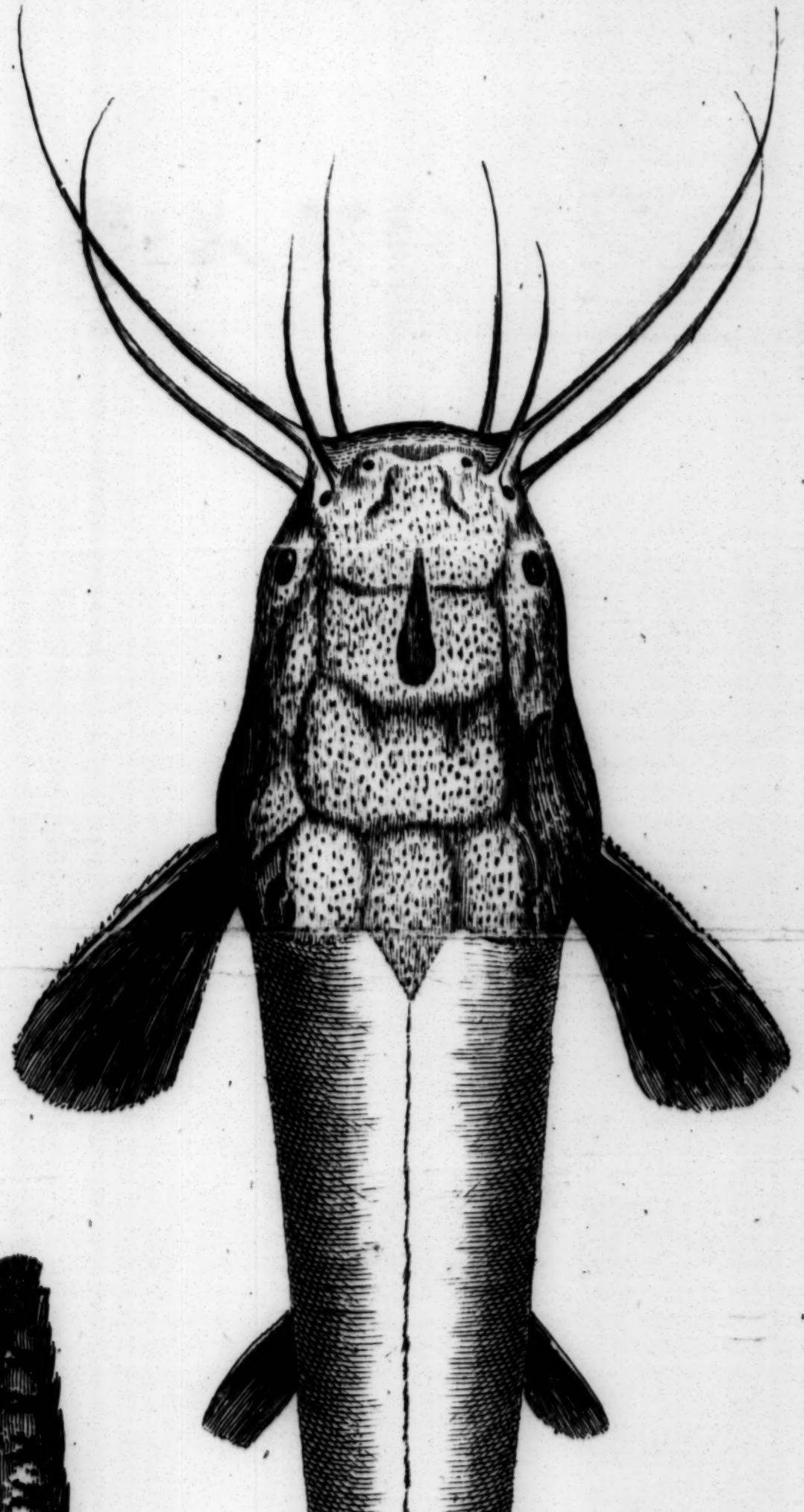
CONTENTS.

CXV. *An Account of an Earthquake felt at* Colen, Leige, Maeſtricht, *&c. on the* 19*th of* November, 1756: *In a Letter from Mr.* Abraham Trembley, *F.R.S. to* Thomas Birch, *D.D. Secretary to the* Royal Society. *Tranſlated from the* French. p. 893.

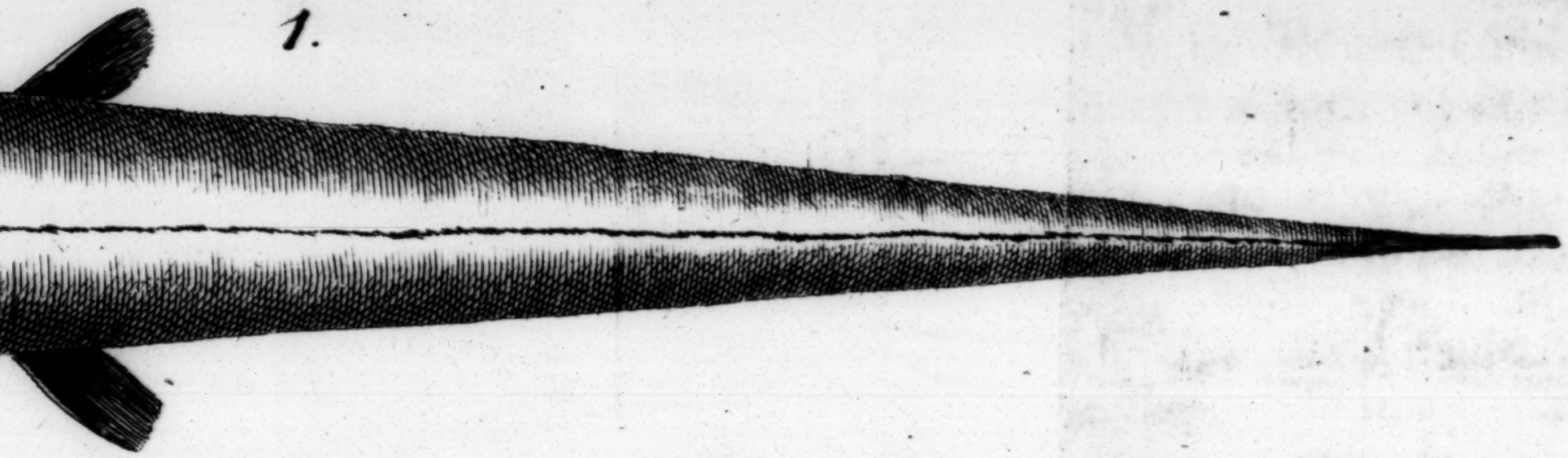
CXVI. *An Account of a Treatiſe, in* Latin, *preſented and dedicated to the* Royal Society, *intituled,* " Gottlob Caroli Springsfeld, M. D. &c. " &c. commentatio de prærogativa Thermarum " Carolinarum in diſſolvendo calculo veſicæ præ " aqua calcis vivæ," *by Mr.* William Watſon, *Member of the Royal Academy of Phyſicians at* Madrid, *and F. R. S.* p. 895.

LX. *An*

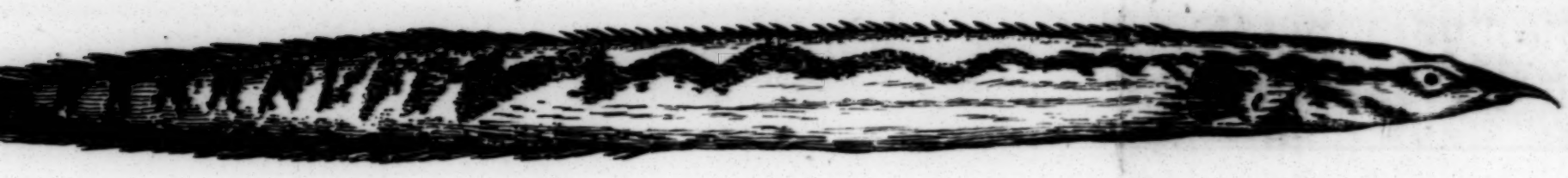




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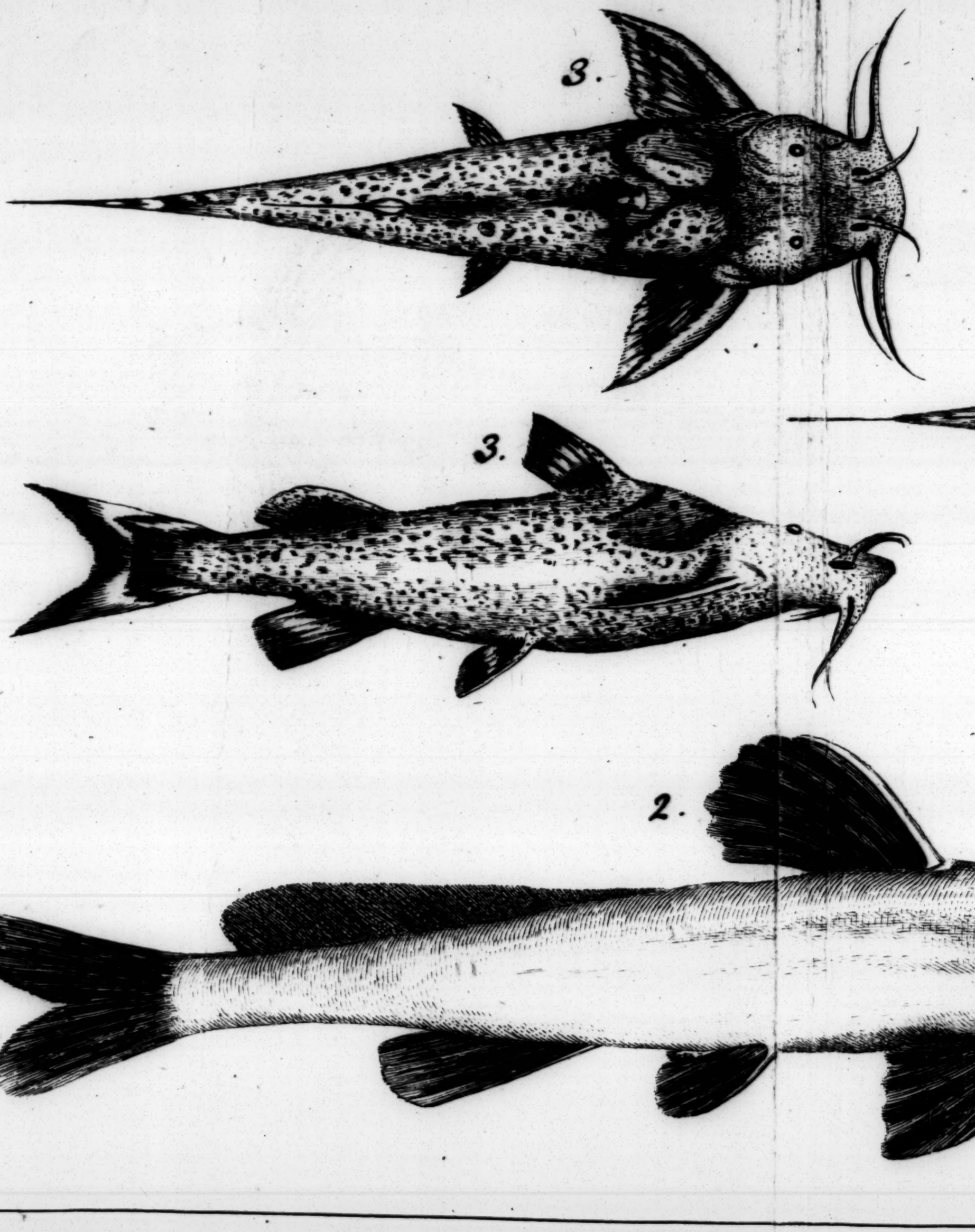
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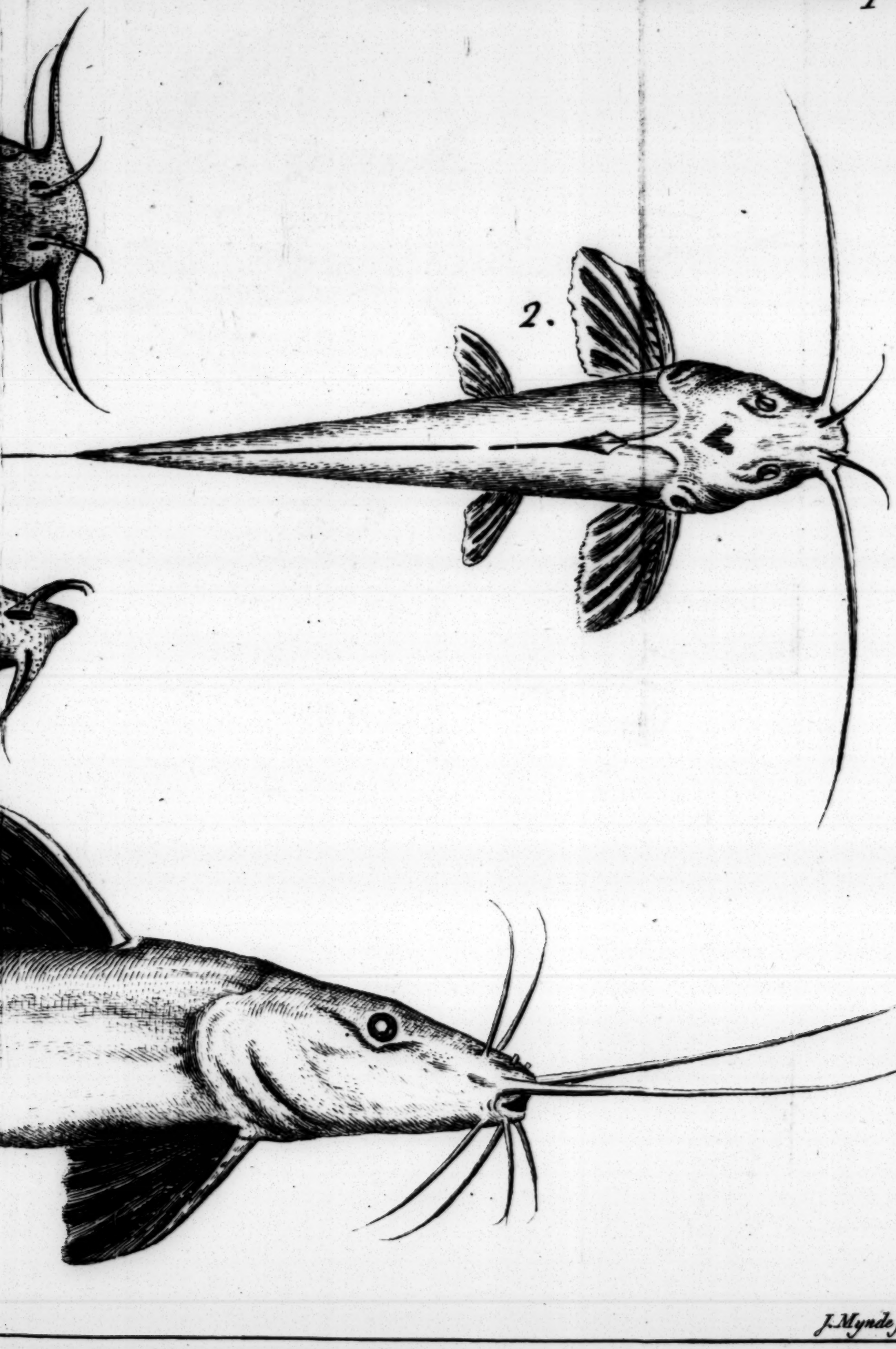


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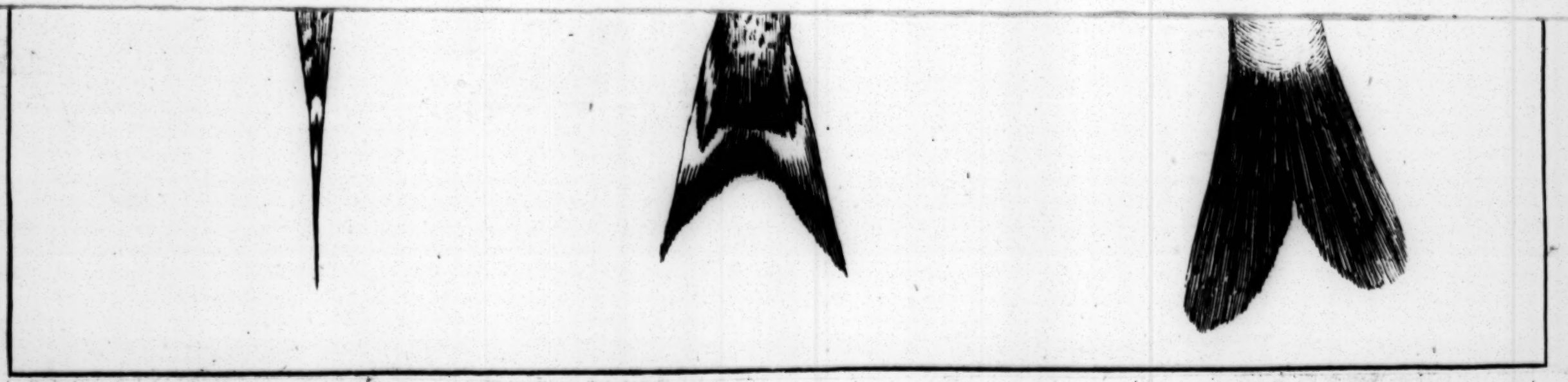


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LX. *An Account of Four undeſcribed Fiſhes of* Aleppo; *in a Letter to Mr.* Peter Collinſon, *F.R.S. by* Alexander Ruſſel, *M.D.*

SIR,

Read Jan. 15, 1755. HAVING at Aleppo met with a few fiſhes, which appeared to me ſingular, I was induced to bring with me drawings and deſcriptions of them; which I have ſince ſhewn to ſeveral curious gentlemen, abroad as well as in *England*, to all of whom I found they were likewiſe unknown.

Fig. 1 and 4 (Tab. XII.) ſeem to be quite new *genera*; and 2 and 3, (Tab. XIII.) tho' they belong to the ſame *genus* with the *Myſtus*, deſcribed by *Gronovius* in his *Muſ. Ichthyologic*, p. 34. No. 83, and p. 35, No. 84; yet are ſpecies of that fiſh, that I cannot find have hitherto been deſcribed. I therefore imagined, that the laying them before the Royal Society would not be diſagreeable; and as you were ſo kind as to offer me your aſſiſtance on this occaſion, I have ſent you the drawings and deſcriptions incloſed. I am,

SIR,

Lime-ſtreet, 9 Dec. 1755. Your moſt obedient

humble ſervant,

Alex. Ruſſell.

THE fiſh *Fig.* 1, in its ſhape a good deal eſembles the Silurus Rondeletii; like it too having no ſcales. Its length (from the noſe to the tip of the tail) 20 inches; weight 20 ounces; but they are of different ſizes. The head and back are of a black colour. The lateral line runs quite from the head to the tail, on the middle of the ſide; below which, to the belly, the colour gradually changes into a dark purple: of the ſame colour is the under part of the head. The head is flat, and in length near five inches. The body roundiſh, till within a few inches of the tail, where it grows flat. The mouth is not ſo large in proportion as that of the Silurus; it has no tongue, and the ſtructure of the mouth and palate agree exactly with the deſcription of that fiſh. From the edge of the noſtril on each ſide ariſes a ſmall *cirrus*; and from the angles of the mouth two others, that are ſtronger, and twice as long. On the lower lip are four more, the two external being the longeſt. The eyes are ſituated near the corner of the mouth, cloſe upon the inferior edge of the upper jaw. The *branchiæ* are four on each ſide, and all of them have a double row of ſharp points, like the teeth of a comb. It has two fins, ſituated near to the *branchiæ*, conſiſting of ſeven *radii*, to the interior part of which is joined a pretty ſtrong prickly bone: about an inch above the *anus* are two ſmaller fins. A long fin extends from a little way under the *anus* to the tail, as another of the ſame kind does from the neck all along the back: neither of theſe fins join with the tail, which is round at the tip, and compoſed of about twenty-two feathers.

This

This fiſh is found in the river Orontes, and I believe alſo in ſome ſtagnant waters near to it. The markets of Aleppo are plentifully ſupplied with it, from the month of November till the beginning of March. The fleſh is red like beef, and of a rank taſte; and tho', for want of better, eat much by the people, yet is eſteemed unwholſome. The name it uſually goes by is *Semack al Aſwad*, which ſignifies the Black Fiſh. Its proper name however, among the natives, is *Siloor*.

The fiſh *Fig.* 2, is about four inches long. The head is large and flat, the body oblong and compreſſed. Its colour is moſtly of a dark ſilver. The eyes are large and protuberant. From the lower jaw ariſe four *cirri*; the longer meaſure one inch, the ſhorter two thirds of an inch. From the upper jaw ariſe two longer, each meaſuring two inches and a half, of a firmer texture than either thoſe of the lower jaw, or two other ſmall ones placed juſt by the noſtrils. Between the two long *cirri* are two ſmall *tubuli*. The whole of the *cirri* are of a white colour, excepting the two longeſt, which are of a darkiſh colour, like the upper part of the head. The fins are eight in number. Two by the gills, each furniſhed with a ſtrong ſaw-like bone. Two ſmall ones near the *anus*. One of eight *radii*, ſituated half-way between the *anus* and the tail. One conſiſting of ſeven *radii* on the back. Another fin, of a membranous and fleſhy texture, ariſes from the middle of the back, and is continued all along to the tail. The tail is forked.

This fiſh is found in the river Coic at Aleppo, where the fiſh in general are extremely ſmall, in

proportion to thoſe of the ſame kinds found in other rivers, probably owing to the aſſiduity of the fiſhermen. It is called by the natives, *Zakzuk*.

Fig. 3. repreſents a fiſh, which in its general form ſomewhat reſembles the above. It is in length three inches. The head is rather flatter; the mouth has a more inferior ſituation, and is in proportion larger than that of the former fiſh; the eyes much ſmaller. The *cirri*, ſituated as in the other, are eight in number, but much ſhorter thoſe that riſe from the upper jaw (being the longeſt) meaſuring only one inch; they are alſo flatter at their origin.

They both agree in the number of their fins; neither has the ſaw-like bone in the fin of the back, but only in thoſe near the gills. The fleſhy fin of the back is much ſmaller than in the *Zakzuk*, and riſes at a much greater diſtance from the back fin. The colour is a pale ſilver marbled with grey; particularly the lower part of the fins and tail. The two larger *cirri* likewiſe marbled, the others white.

Theſe two fiſhes (*Fig.* 2, 3.) have no ſcales, and the palate and other ſtructure of the inſide of the mouth is like that of the *Silurus*.

This laſt deſcribed fiſh is alſo from the river Coic.

The fiſh *Fig.* 4. has upon a ſlight view ſo much the appearance of an eel, and, except its not being ſo fat, eats ſo like that fiſh, that tho' it is much oftener brought to the tables of the Europeans at Aleppo than any other fiſh found in the river Coic, it has never been ſuſpected of being any-ways different from the common eel; and yet, upon examination, it will be found of quite another *genus*.

The

The head is long and ſmall. The extremity of the upper jaw runs out to a narrow point like the bill of a bird; on each ſide of which, a little diſtant from the extreme point, are two *tubuli*, or proceſſes. As in the common eel, there are two fins at the gills. From the occiput all along the ridge of the back, ſmall prickles are placed at little diſtances, reſembling the teeth of a ſaw; theſe terminate at the origin of a membranous fin, riſing about four inches from the tail, and is continued (as in the eel) along the lower part of the belly to the anus, at which place are alſo found two or three prickles. The colour of the head and back is blackiſh, variegated with dark-yellow ſpots. The lower belly white, changing gradually into a yellowiſh caſt. The fin of the lower belly near to the anus is yellow, the other half ſpotted with black. The length of the fiſh deſcribed was eleven inches.

LXI. *An Account of a curious, fleſhy, coral-like Subſtance; in a Letter to Mr.* Peter Collinſon, *F. R. S. from Dr.* John Albert Schloſſer, *M. D. F. R. S. with ſome Obſervations on it communicated to Mr.* Collinſon *by Mr.* John Ellis, *F. R. S.*

Dear Sir,

Read Jan. 22, 1756. I Hir'd ſome fiſhermen to drudge for me in this harbour, in order to examine the ſmall Engliſh coral, or *corallium noſtras* of *Ray's Synopſis*, recent in the microſcope. The firſt

firſt time they hauled in the drudge, I diſcovered a moſt extraordinary ſea-production ſurrounding the ſtem of an old *fucus teres:* it was of a hardiſh, but fleſhy ſubſtance, and more than an inch thick, of a light brown or aſh colour, the whole ſurface covered over with bright yellow ſhining and ſtar-like bodies, which induced me to believe it to be an undeſcribed ſpecies of alcyonium. I put it immediately into a bucket of ſea-water, expecting every moment, that the polypes, which I thought to lodge in thoſe little ſtars, would extend and ſhew themſelves like thoſe of the alcyonium, N° 2 of *Ray's Synopſis*, commonly called dead-man's hand; but after more than half an hour's fix'd attention, the veſſel lying very quiet all the time, I did not perceive the leaſt appearance of any polypes: upon which I brought them to ſhore in the ſea-water, and then, by means of my microſcope, I diſcovered every one of thoſe ſtars to be a true animal, and much more beautiful than any polype, but quite of a different ſtructure; which I ſhall now deſcribe to you.

Every one of thoſe ſtars is compoſed of many thin hollow radii, of a pear-ſhape form, from five to twelve or more in number, all united intimately at their ſmaller end: every radius appears broad at the extreme part from the center, and a little convex in the middle of this raiſed broad part. When the animal is alive, there appears a circular little hole, which contracts and opens itſelf frequently. All the radii are of this ſtructure; but their common center, which is formed by a combination of all the ſmall converging extremities, exhibits an opening of a circular, oval, or oblong figure, forming a kind of riſing rim

like

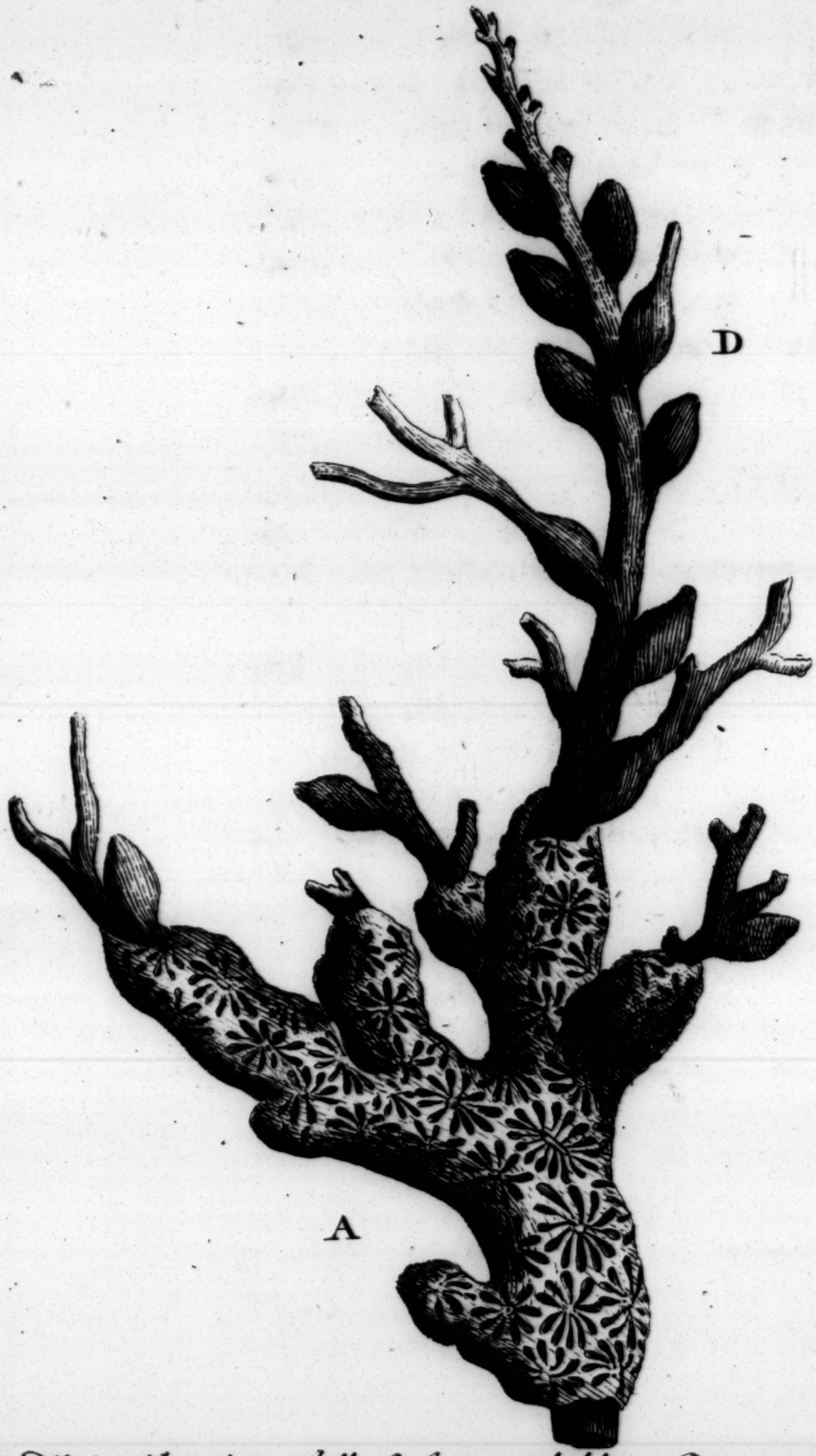
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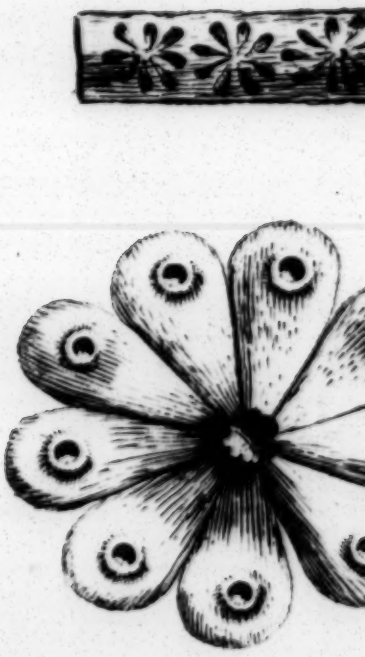
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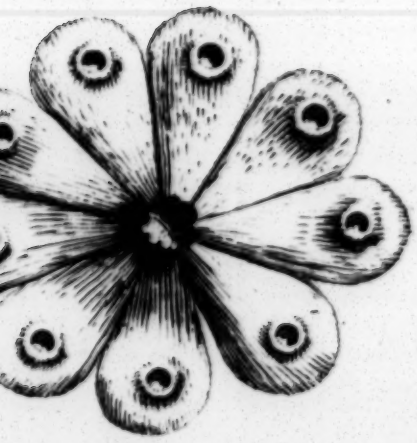


Fleshy Alcyonium full of Stars with blunt Rays surrounding a Fucus found near the Lizard Point

Brooking delin.



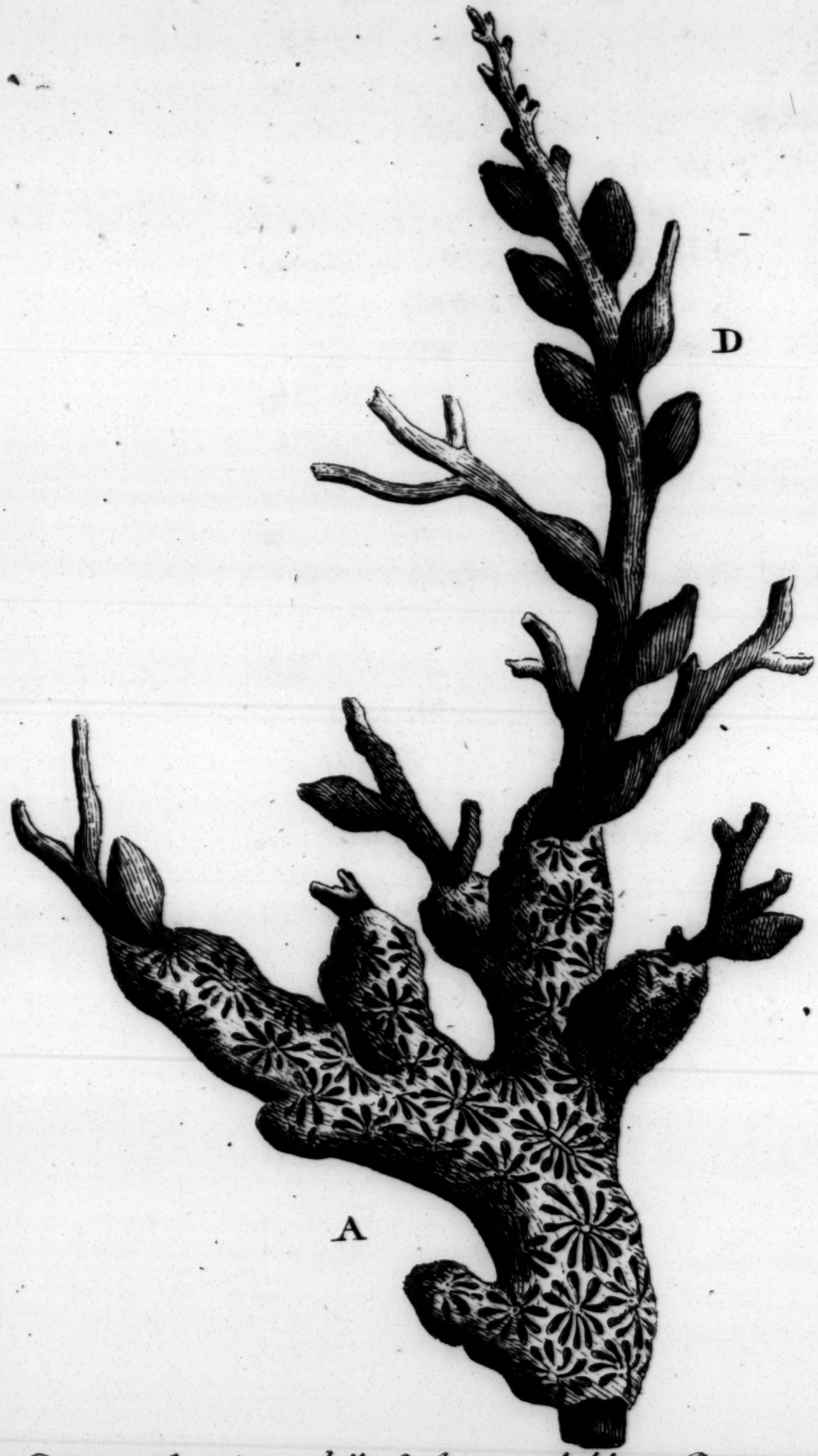
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Fucus found in the Sea

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Fleshy Alcyonium full of Stars with blunt Rays surroun
near the Lizard Point

Brooking delin.

like a cup, which, when the animal is alive and at reſt, contracts and expands itſelf to many different degrees, with great alertneſs and velocity, though ſometimes it remains a great while expanded, or contracted. In all theſe holes, the central large one, as well as the ſmaller ones (which laſt I take to be the mouths of the animal) I could not perceive any tentacula, or claws, on the outſide; but by looking into them very narrowly, I ſaw ſomething like very tender little fibres moving at the bottom of their inſides.

By comparing and examining all the various pieces I had collected of this fleſhy ſubſtance, with its ſhining ſtars, I obſerved, that the ſize and colour, as well as the very figure of theſe ſtars, varied greatly, but the ſtructure of the leaf-like radii, and that of their mouths, and their motions, were perfectly the ſame, in every one individual.

Many of theſe bodies I have found ſo thick and large as to reſemble the great branch'd Madrepora coral, eſpecially as they are generally to be met with covering and incloſing the ſtem and branches of this ſtiff, ramoſe fucus.——Thus far D. Schloſſer.

Fig. A (TAB. XIII.) expreſſes this alcyonium in its natural ſize, ſurrounding the ſtem and branches of a fucus. I have called it, *alcyonium carnoſum aſteriſcis, radiis obtuſis, ornatum.*

Fig. B, part of a leaf of the common alga, or ſea-graſs, with 4 of theſe ſtarry figures on it.

Fig, C, one of the ſtars magnified.

Fig. D, repreſents the fucus, on which it grows, which I cannot find any-where deſcribed. I have intitled it, in my collection of Engliſh fucus's, by the following deſcriptive name, *Fucus teres fruteſcens,*

teſcens, germinibus arborum gemmas fructiferas referentibus.

I have had an opportunity lately of examining this curious, fleſhy, coral-like figure in the microſcope, and find, that all the interſtices between the ſtars are fill'd with eggs of different ſizes, each adhering by one end to a very fine capillary filament. The ſmalleſt eggs are globular, and as they advance in ſize, change to an oval figure; from thence they aſſume the ſhape of one of the radii of the ſtars.

In ſeveral of theſe ſtars I have obſerved a ſmaller radius, as it were, endeavouring to get into the circle; and notwithſtanding their ſeeming connection in the center as one animal, I believe I ſhall ſoon be able to ſhew you, in a drawing from the microſcope, that each radius is a diſtinct animal by itſelf. I am,

Dear Sir,

Lawrence-lane, Jan. 22, 1756.

Your moſt affectionate Friend,

John Ellis.

LXII. *Two ſingular Caſes of diſeaſed Knee-joints ſucceſsfully treated. The firſt by topical Applications; the ſecond by Operation.* *By Mr.* Joſeph Warner, *F. R. S. Surgeon to* Guy's-Hoſpital.

Read Jan. 22, 1756.

DSeaſes of the larger joints of the extremities have always been look'd upon by ſurgeons of the greateſt eminence in their pro-

profeſſion, to be attended with conſiderable danger to the patient; and with the greateſt reaſon, ſince they have been convinced from much experience, that theſe maladies are too often the conſequences of depraved habits of body, ariſing from ſcrophulous, ſcorbutic, or ſome other general cauſe. But tho' we are ſufficiently apprized of theſe facts, and that they too often baffle the greateſt ſkill in phyſic and ſurgery, we are nevertheleſs not to infer from hence, that every diſorder of this kind is attended with the like bad circumſtances; ſince it is well enough known to the experienced, that diſeaſes of the joints, particularly thoſe of the knee, are ſometimes merely local complaints, which may not only be aſſiſted by ſurgery, but perfectly cured. Theſe ſpecies of tumors I now hint at, are thoſe, which are diſtinguiſhed by the name of hydrops articuli, or the dropſy of the joint; of which there are, as I have often obſerved, two different kinds. The one, wherein the diſeaſe is ſituated in the membrana adipoſa, and neighbouring parts on this ſide the capſular ligament. The other is that ſpecies of diſeaſe, wherein the fluid is contained within the capſular ligament, betwixt the extremities of the thigh-bone, and the largeſt bone of the leg. The firſt ſpecies of tumor may be diſtinguiſhed from the ſecond by the touch; from the appearance of the tumor of the firſt kind, which is pale and uniform; from a want of fluctuation; and from the little or no degree of pain attending it. The repeated uſe, for ſome weeks, of emollient fomentations, mercurial frictions, and gentle purges, has been often known to remove this diſorder. At other times it has been found, that

theſe applications have had little or no effect, but that the diſeaſe has given way to, and been totally removed by the uſe of perpetual bliſters to the part affected; which ſhould, in moſt inſtances, be continued for ſeveral weeks. At other times, I have known the Piſſeleon Indicum, in Engliſh called the Barbadoes tar, to have ſo good an effect, by being applied every day to the joint, for ſome weeks, even after every other remedy had failed, as to cure ſuch a diſorder of the knee-joint, as had hitherto been judged deſperate: in which caſe there plainly appeared to be an enlargement of the bones, as well as a very conſiderable one of the integuments, and of the tendinous and ligamentous parts, but without any apparent inflammation. In this inſtance there was no extravaſated fluid could be diſcover'd; however, there was an immobility of the joint, and a conſiderable contraction of the hamſtrings. The pain was extravagantly great, which the patient deſcribed as ſhooting thro' the ligaments of the joint, the knee-pan, the extremities of the thigh-bone, and thoſe of the leg. He had a ſevere ſymptomatic fever, which had been of many weeks continuance, and was become greatly emaciated thereby. The reaſon for my giving ſo particular a relation of the circumſtances attending this fact proceeds from my deſire of recommending a tryal of the ſame remedy, in the like caſes; which, as far as I can judge from my own experience, may always be ſafely done, where there is no degree of inflammation already formed upon the integuments. And I am farther induced to communicate a ſhort hiſtory of the caſe to this Society, as it is an application I never ſaw made uſe of before, in the like

like caſe, tho' the uſe of it has not been uncommon in old ſprains of the joints; wherein it has oftentimes been found to be of ſingular ſervice, even when other remedies have been ineffectually tried.

The ſecond ſpecies of hydrops articuli, or that wherein the extravaſated fluid is contained within the capſular ligament, may be diſtinguiſhed from the firſt, from its deep ſituation; from the fluctuation, which is felt upon patting the knee on one ſide, while the other hand is held immoveably on the oppoſite ſide; from the degree of pain ariſing from the diſtenſion, which the capſular ligament ſuffers, in conſequence of its contents; from the incapacity of bending the joint; and from the circumſtance of its being attended with no general complaints of body, as well as from the ſudden enlargement of the tumor; upon the increaſe of which depends the degree of uneaſineſs in the part. This is very far from being the caſe, in that kind of diſeaſe called the ſpina ventoſa, which ariſes originally from the medulla and bone itſelf being diſeaſed; from whence proceed grievous pricking and throbbing pains, that come on previouſly, in general, to any viſible enlargement of the part affected, or any diſcoverable quantity of fluid depoſited in the joint; the difference of which ſymptoms reſulting from the different diſeaſes may be learned from the ſucceeding caſe, wherein it was judged neceſſary to cut more than once thro' the capſular ligament, in order to evacuate its contain'd, extravaſated fluid; which, contrary to the common received opinion of wounds of the ligaments being attended with certain deſtruction to the limb, ſhould always be done under the like bad circumſtances, in reaſonable expectation

of removing a complaint, which totally diſables the patient, and too frequently terminates in the loſs of the limb, when neglected. And I am more particularly inclined to recommend this practice, as I am convinced, that this diſeaſe is out of the reach of ſuch applications, as are of ſervice in other diſeaſes of theſe parts, whoſe ſituation is more ſuperficial; that is, on this ſide the ligament, in which is contained the ſynovia.

William Drury, aged 28, by buſineſs a porter, was put under my care, on the 5th of September, 1754, for a diſorder in his knee. Upon enquiry, it appeared greatly ſwelled, was attended with exceſſive pain, which was continual: there was not the leaſt degree of inflammation upon the integuments; the patient was incapable of bending his knee in the leaſt degree, or of ſetting his foot to the ground. He could get no reſt. The diſorder aroſe without any accountable cauſe, and had been only of three weeks ſtanding. Upon placing one hand on the outſide of the knee, and by patting with the other on the inſide, it was eaſy to diſcover a fluctuation; on which account I judged it adviſeable to make an opening into the tumor, which I did by inciſion on the upper and inſide of the knee-pan, as this was the moſt prominent part; upon which, a thick, gelatinous fluid, deeply tinged with blood, was diſcharged in a full ſtream to the quantity of fourteen ounces. After the whole of it was evacuated, I paſſed a probe thro' the wound, which went under the knee-pan: the wound was ſuperficially dreſs'd with lint, and the whole of the knee was covered with a pultice of ſtrong beer-grounds and oatmeal. The patient complain'd

of

of conſiderable pain for about four hours afterwards, when he grew eaſy, and ſo continued till the ſecond day after the operation, when the knee became a good deal painful: there was no diſcharge from the wound. Upon enquiry I found he had not been at ſtool for three days, which occaſioned the adminiſtring of a clyſter, by which ſtools were procured, and the pain became conſiderably abated. On the third day from the operation there appeared a conſiderable diſcharge, and his knee was quite eaſy, which continued ſo till the ſixth day, when the diſcharge was much abated. The pain returned and continued till the eighth day, when the diſcharge returned again, and the pain was removed. Obſerving from this time, that the diſcharge encreaſed, and ſo continued eaſy till the eleventh day, which proceeded altogether from within the joint, I dilated the wound, that the matter might have a more ready iſſue. This anſwered my expectation, and the patient continued eaſy till the fifteenth day, when he complained of a return of pain. Upon examination, I perceived the outſide of the knee was ſwelled, and upon preſſure I diſcovered a fluctuation; which induced me to make an inciſion thro' the integuments and capſular ligament, on this ſide; which, I diſcovered, by the uſe of the probe, that paſſed under the knee-pan, to have a communication with the wound on the inſide. From this time the patient went on very well, without any farther complaints; and in about twelve weeks from the firſt operation, he became perfectly well, and ſtill continues ſo, without any other complaint than that of a ſmall

degree

degree of ſtiffneſs in the joint, as I have very lately had an opportunity of informing myſelf.

During the whole time of the cure, I made uſe of emollient fomentations, dreſſed the wounds ſuperficially, and continued the pultice of ſtrong-beer grounds and oatmeal, which were the only methods taken in ſurgery for his relief.

Hatton-Garden,
Jan. 31, 1755.

LXIII. *Extract of a Letter from Mr.* William Pye, *dated* Manilla, Oct. 1ſt, 1754, *to his Brother in* London. *Communicated to Mr.* Benj. Wilſon, *F. R. S. by the Hon. Mr.* Barrington.

Read Jan. 29, 1756.

I Will now give you ſome deſcription of this place. Manilla is one of the largeſt of the Philippine iſlands, and the city is much larger than Oxford, and has two univerſities in it, and is inhabited only by Spaniards. The houſes are large, and built very ſtrong; the ground-floor is ſtone; the walls of a prodigious thickneſs; all above is wood, and ſo contrived, that every piece of timber has a connection with each other, all over the houſe: they are let into one another, and joined together, that the earthquakes, which are very terrible and frequent, may not throw them down. The convents are likewiſe very ſtrong and handſome. The ſuburbs are very extenſive, and well inhabited.

In

In the year 1750 they had an earthquake here, which laſted for three months, with almoſt continual tremblings, which at laſt broke out in an eruption, in a ſmall iſland in the middle of a large lake, all round which, the bottom is unfathomable. The third day after the commencing of the eruption, there aroſe four more ſmall iſlands in the lake, all burning; and about a mile diſtance from one there is a continual fire, which comes out of the water, where there is no ground, for upwards of an hundred fathoms deep. This I ſaw myſelf, and went very near it. I will get a draught of it and ſend it you. This happened but four years ago, and if you were to feel ſome of theſe ſhocks, you would think they were capable of producing any thing, for they are very terrible indeed.

LXIV. *An Eſſay on the Waters of the* Holy Well *at* Malvern, Worceſterſhire. *By* J. Wall, *M. D. Communicated by the Rev.* Charles Lyttleton, *L. L. D. Dean of* Exeter.

Reverend Sir,

Read Feb. 5, 1756.

AS you are pleaſed to deſire ſome account of my obſervations on the Malvern-Waters, I have here tranſmitted them. That I did not do this ſooner, you will, I hope, impute to the true cauſe, the multiplicity of my avocations. I would gladly have repeated the experiments,

ments, and added ſome more; but my want of leiſure and the badneſs of the weather prevented me. I am very ſenſible of the imperfection of this eſſay, and that it does not deſerve the attention of that learned body, to which you are deſirous to communicate it; but as it may perhaps excite ſome more able hand to purſue the ſame ſubject, or induce ſome benevolent minds to make a well of ſuch virtues more extenſively uſeful, by adding ſome proper accommodations to it, I do not heſitate to offer it to you, crude as it is.

An Account of ſome Experiments made upon Malvern-Water, *at the Spring-head*, Sept. 15, 1743, *being a warm, clear Day, in a dry Seaſon.*

1. At the ſpring-head it is extremely cold.

2. It leaves a peculiar pertneſs, or acrimony in the throat, after it is ſwallowed, when drank immediately from the ſpring; but grows remarkably ſofter upon keeping, more eſpecially if the place be not very cool.

3. Upon pouring it, when freſh taken from the ſpring, into a large deep veſſel, a great number of very ſmall air-bubbles aroſe from the bottom, and continued to do ſo for a great while together.

4. Some powder'd loaf ſugar being put into a glaſs of the water cauſed at firſt no alteration; but when the ſugar began to diſſolve, an extraordinary number of air-bubbles aroſe inceſſantly, and continued to do ſo for a very conſiderable time.

5. Being mixt with volatile ſpirit of ſal ammoniac, it acquir'd a very dilute, bluiſh tincture, but remain'd equally tranſparent as at firſt, without the leaſt

leaſt milkineſs. This blue tinct was ſo very dilute, that it was barely perceptible.

6. Oil of tartar per deliquium being dropt in it, no alteration in colour or tranſparency enſued; nor was there any precipitation, or ebullition.

7. Rheniſh-wine and weak ſpirit of vitriol produced no ebullition or conflict.

8. With galls it grew turbid, but acquired no purpliſh caſt.

9. Solution of ſilver being mixt with the water did not at firſt alter its colour or tranſparency, but by degrees the water grew a little milky; and, by ſtanding ſome time, became muddy; and then of a dirty reddiſh purple, and at laſt, a powder of a deep purple colour was precipitated to the bottom of the glaſs.

10. A tincture of logwood, made in diſtilled water, was not alter'd in colour; only the tinct was diluted in proportion to the quantity of water mixt with it.

11. In like manner it alter'd not, but only diluted, the colour of ſyrup of violets.

12. It bears ſoap extremely well.

13. This water being carried to Worceſter, which is about eight miles diſtant from the ſpring, in clean bottles cloſe ſtopt, was weighed very accurately in a large veſſel with a very ſlender neck, by a nice ballance, which would bear 14 ℔ in each ſcale, and yet turn with a ſingle grain; when it was found, that this veſſel filled with

Malvern-water weighed	℥ 51	ʒ 2	℈ 2	gr. 6
Briſtol-water	℥ 51	ʒ 6		gr. 4
Rectified ſpirit of wine	℥ 41	ʒ 6	℈ 2	gr. 6,

14. Three quarts, wine-meaſure, being ſlowly evaporated in a ſilver veſſel, left not any fæces, or powder that could be collected, but only tinged the bottom of the veſſel of a pale yellow colour, as if it had been ſlightly gilded.

15. Some of this water having been ſent up to the very learned and ingenious Dr. Hales (whoſe genius for experiments of this kind, and veracity in relating them, are above all encomium) was by him examined. The following is an extract of his letter to the rev. Mr. Clare of Madresfield, on this ſubject.

Teddington, near Hampton-court, Oct, 25, 1750.

SIR,

" I Have examined the Malvern-water by evapo-
" rating a pound averdupoize of it to a dryneſs,
" in a Florence flaſk, cut with a red hot iron ring to
" a mouth of about three inches diameter, as I have
" in the ſame manner examined many other purg-
" ing, ſteel, rain and common waters; and find, as
" you told me, that it is a very pure water, with leſs
" than a grain of ſediment, aſh-coloured, which does
" not liquefy by ſtanding, as the ſediment of moſt
" waters does: a ſign, that it has no ſalt in it. But
" it was very obſervable, that when it was almoſt
" evaporated to a dryneſs, there aroſe inviſible pun-
" gent vapours, which ſmelt much like the vapour
" of burning brimſtone; which was obſerv'd, not
" only by myſelf, but by others, who came into my
" parlour. This pungency was very ſtrong, when
" my noſe was near the flaſk, which was ſet in a
" pipkin ſurrounded with ſand. We may reaſonably
" conclude,

" conclude, that the ſanative virtue of this water is " in this ſubtle volatile ſulphur.

It appears from theſe experiments, that this water is remarkably pure, light, free from earth and ſalts of any kind [5, 6, 7, 9, 10, 11, 13, 14.] That it contains ſome mineral ſpirit, or at leaſt a volatile elaſtick fluid [2, 3, 4.] That there is ſome reaſon to ſuſpect that it is ſlightly impregnated with copper [5]; a ſolution of which may probably be effected by the ſulphureous gas obſerved by Dr. Hales [15]; and that it contains ſomething bituminous [14].

So pure a water may naturally be ſuppoſed to keep well, and yet it is not always found to do ſo, being in ſome ſeaſons apt to get ſouriſh, and to be full of viſcid films, even when all imaginable care has been taken in regard to the bottles, *&c.* ſo that there are certainly ſome ſubſtances concealed in the water, which our experiments have not as yet diſcovered.

This water has been long famed in the country for many extraordinary cures perform'd by it; but being ſituated in a place, where there is at preſent no accommodation for ſtrangers, its uſe has not been ſo extenſive as otherwiſe it might have been. I find it mentioned in Banniſter's breviary of the eyes, printed A. D. 1622, in theſe lines.

A little more I'll of their curing tell,
How they help ſore eyes with a new found well.
Great ſpeech of Malvern-hills was late reported,
Unto which ſpring people in troops reſorted.

There are two ſprings, both of which riſe very high up the hill, facing the Eaſt; the uppermoſt,

which is about a hundred yards higher upon the hill, is chiefly applied to the eyes; and the other uſed internally, in ſeveral ſcorbutic and other diſorders; or externally to tumors and ſores. This diſtinction is taken notice of by almoſt every writer, who has treated on the geography or natural hiſtory of this county; and yet there does not, from any experiment, appear to be any real difference between them.

The ſprings are not encreaſed or diminiſhed very ſenſibly, either by rains, or drought; and yet the water certainly receives ſome alteration from the variety of the weather; becauſe it has been obſerved by thoſe, who have waſhed their ſores at the ſpring, that the water does not ſo well agree with them after heavy rains, or fierce ſhowers, as in clear ſettled weather; which probably is owing to the admixture of ſome extraneous ſubſtance with the water. This alſo may be the reaſon, why, in ſome later experiments, the water has appeared to contain more earth than it did in thoſe I formerly made, when the ſeaſon was much drier than it has been for ſome years laſt paſt.

The water, upon its firſt uſe, purges moſt perſons, and that pretty briſkly, if the quantity they drink be conſiderable; ſome it vomits, but without much ſickneſs; but it is diuretic in all. It has been long uſed, both externally and internally, with very great ſucceſs, particularly in old foul ulcers, diſorders of the eyes, ſcrophula's, leproſies and other diſeaſes of the ſkin. Many wonderful cures I have been myſelf witneſs to in each of theſe caſes.

Mr. G—— S——, a mercer of this town, when he was young, had a ſcrophulous ulcer in the elbow, which

which had much enlarged the joint and fouled the bone. He had been long attended by two ſurgeons of eminence, who had at laſt propoſed amputation, as the only probable means of cure. His parents not being willing to ſubmit to this, ſent him to Malvern, and by the uſe of this water, for a few months he was perfectly cured, and the limb has remained well ever ſince.

A poor woman near this city was covered with the moſt frightful leproſy I ever ſaw. The ſcabs were very numerous, large, and in many places more than a quarter of an inch thick. She had loſt her eyebrows, and was ſo hoarſe that ſhe could hardly articulate. Many of the moſt efficacious medicines had been tried by me and others without ſucceſs; at laſt ſhe was ſent to Malvern, and a little hut built for her near the well, by the charity of a neighbouring gentleman*. She uſed the water both externally and internally. In two or three months her ſkin was tolerably cleared, and ſhe began to recover her voice; and by continuing the water, ſhe was at length perfectly cured.

In the year 1754 I recommended theſe waters to a young woman, daughter to one Mr. Wilmot, a ſhoemaker in Bewdly. She had long had a ſcrophulous ulcer in each cheek, and an ophthalmy in each eye, which made her unable to bear the light, or to find her way about the houſe. She had continued in this condition nine or ten months, and tho' ſhe had applied to ſeveral perſons of ſkill, had not received much benefit from any medicines or applications

* Reginald Lygon, Eſq;

When

When ſhe was brought to the well, ſhe was forced to be led by another perſon; but ſhe had not uſed the waters a week before ſhe ſaw well enough to diſcover a flea leaping on her bed. Her ſight is now perfect, and the ulcers are healed.

A child of one Mr. Morris, a grocer in this town, about three years of age, had the ſubmaxillary glands very much enlarged; he had a ſcrophulous ophthalmy in each eye, and his lips were very much ſwelled, the upper one in particular projected farther than the end of the noſe, which it quite touched, and was excoriated with ſeveral very deep fiſſures in it. He uſed the waters two or three months, and returned home with his eyes quite well, the lips healed and reduced to their natural ſize, and the glands of the neck alſo very much leſſened.

Theſe are a few out of the very many inſtances of the efficacy of theſe waters, which I have ſeen myſelf, hundreds might be produced: if there were occaſion.

Thoſe, who uſe the waters externally, uſually bathe in them with their linnen on, and dreſs upon it afterwards wet as it is. The ſores, or tumors alſo, are covered with linnen, which is kept conſtantly wet with the water. During this courſe they ought to drink nothing but the water, and to take that in as large a quantity as they conveniently can. This method, odd as it is, has not hitherto been found to be attended with any inconvenience. Thoſe, who uſe it thus externally, are apt to find themſelves hotter than uſual, with an encreaſed thirſt, as ſoon as their tumors or ſores begin to grow better; but for theſe complaints they have a remedy at hand, for

by

by drinking more freely they ſoon go off. Theſe ſymptoms ſeem to ariſe from ſome matter being repelled and taken up into the circulation; but as the water is ſo pure, it is ſoon waſhed off by it, and carried out of the habit.

Indeed the efficacy of theſe waters ſeems to be owing chiefly to their extreme purity and lightneſs, by which they are enabled to pervade the fineſt veſſels, and not being loaded with any earths or ſalts, are capable of diſſolving more than thoſe waters which are already impregnated with them. And if we conſider the ill effects, which waters full of ſtony or ſtyptic particles have on the conſtitution, producing glandular obſtructions and the like, we may in ſome meaſure conceive, how waters, which are pure and almoſt elementary, may aſſiſt in removing ſuch diſeaſes. But beſide this extreme purity, the efficacy of this ſpring muſt be greatly aſſiſted by the elaſtic fluid, which it appears to contain from Exp. 2, 3, 4, as well as by its bituminous or ſulphureous parts, 9, 14, 15. It may alſo be expected to act ſtill more powerfully (both externally and internally) if it be impregnated with any ſubtle tincture from copper; as is probable, not only from Exp. 5, but from the effects ſometimes obſerved upon its firſt uſe. Beſides theſe qualities, I ſuppoſe part of its efficacy in external application may ariſe from its coldneſs.

But whether, by any chemical analyſis we can diſcover its principal contents, or not, ſo long as it is found to produce ſuch extraordinary effects, we may there reſt ſatisfied; experience being the beſt teſt of the nature of any ſpring. For however the methods

methods of examining mineral waters may have been improved by the ſagacity and induſtry of later chemiſts, it muſt be owned, that we are ſtill far from perfection in that point; and perhaps the moſt active parts of waters, on which their virtues chiefly depend, may lie ſo much out of our reach, as not to be the objects of ſenſe, or diſcoverable by any experiments. Dr. Winter, in his *Cyclus Metaſyncriticus*, has a very pertinent obſervation to this purpoſe, which I cannot forbear tranſcribing. "It is "not neceſſary, ſays he, that waters ſhould con-"tain ſo large a quantity of the particles they have "imbibed, as may be evident to our ſenſes: for we "know by experiment, that *reg. antimon.* fre-"quently macerated in wine, loſes nothing of "its weight or ſubſtance, tho' the wine proves "ſtrongly emetic. p. 40." And may not waters be impregnated ſomewhat in the ſame way by effluvia from mineral ſubſtances unknown to us, and therefore not diſcoverable by any experiments?

Worceſter,
Dec. 12, 1755.

J. Wall.

XLIV.

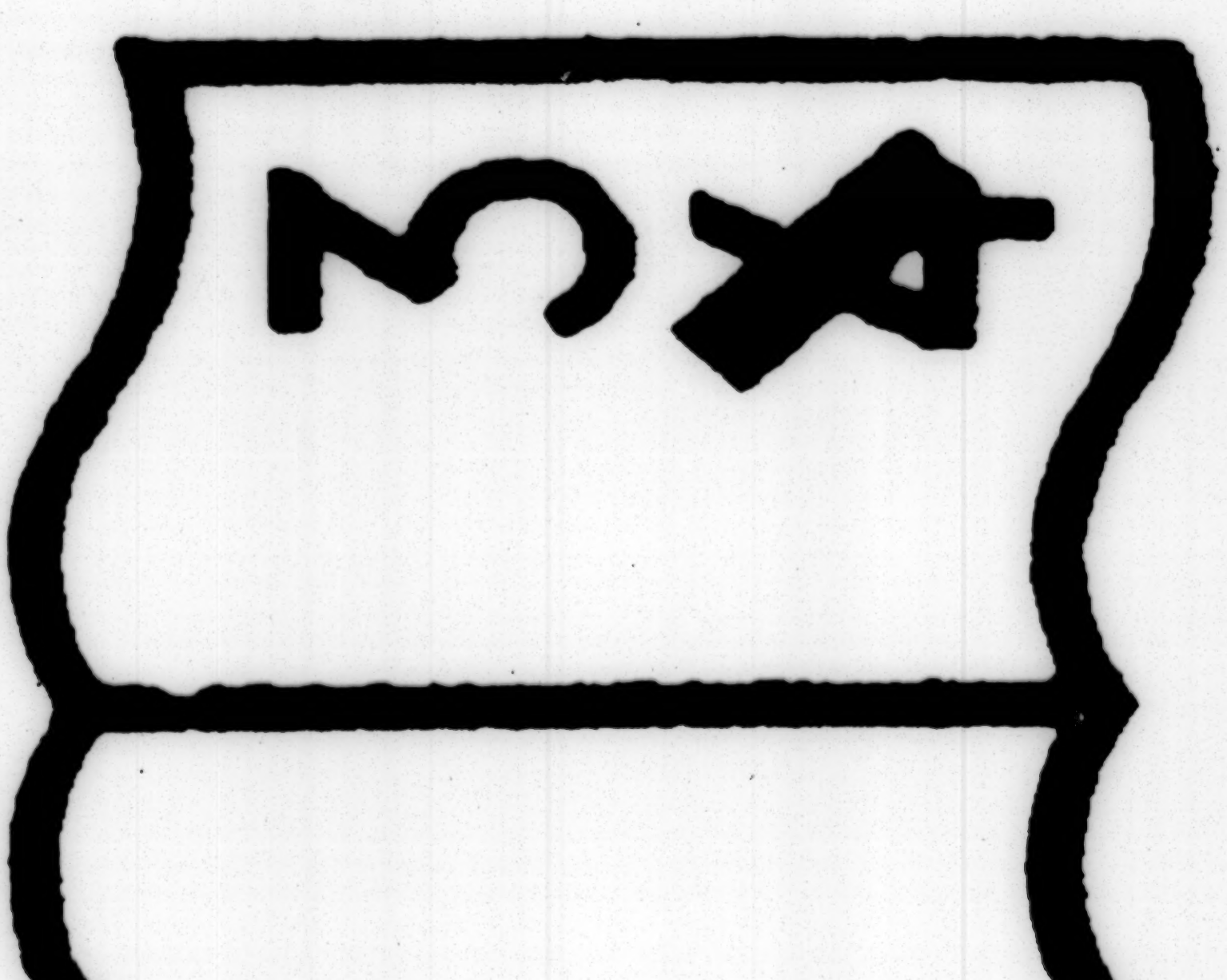
LIV. *An Account of the Caſe of a Man who died of the Effects of the Fire at* Eddy-ſtone Light-houſe. *By Mr.* Edward Spry, *Surgeon at* Plymouth.

Read Feb. 5, 1755. ON thurſday the fourth of December, 1755, at three in the afternoon, Henry Hall, of Eaſt-ſtone-houſe, near Plymouth, aged 94 years, of a good conſtitution, and extremely active for one of that age, being one of the three unfortunate men, who ſuffered by the fire of the light-houſe at Eddy-ſtone, nine miles from Plymouth, having been greatly hurt by that accident, with much difficulty returned to his own houſe. I being ſent for to his aſſiſtance found him in his bed, complaining of extreme pains all over his body; eſpecially in his left ſide, below the ſhort ribs, in the breaſt, mouth and throat. He ſaid likewiſe, as well as he could, with a hoarſe voice, ſcarce to be heard, that melted lead had run down his throat into his body.

Having taken the proper care of his right leg, which was much bruiſed and cut on the tibia, I examined his body, and found it all cover'd with livid ſpots and bliſters; and the left ſide of the head and face, with the eye, extremely burnt; which having waſhed with linnen dipt in an emollient fomentation, and having applied things uſed in caſes of burning, I then inſpected his throat, the root of his tongue, and the parts contiguous, as the uvula, tonſils, *&c.* which were greatly ſcorched by

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Having taken the proper care of his right leg, which was much bruiſed and cut on the tibia, I examined his body, and found it all cover'd with livid ſpots and bliſters; and the left ſide of the head and face, with the eye, extremely burnt; which having waſhed with linnen dipt in an emollient fomentation, and having applied things uſed in caſes of burning, I then inſpected his throat, the root of his tongue, and the parts contiguous, as the uvula, tonſils, *&c.* which were greatly ſcorched by

the melted lead. Upon this I ordered him to drink frequently of water-gruel or ſome ſuch draught; and returning to my own houſe, ſent him the oily mixture, of which he took often two or three ſpoonfuls.

The next day he was much worſe, all the ſymptoms of his caſe being heightened, with a weak pulſe; and he could now ſcarce ſwallow at all.

The day following there was no change, except that, on account of his too great coſtiveneſs, he took ſix drachms of manna diſſolved in an ounce and half of infuſion of ſenna, which had no effect till the day following; when juſt as a clyſter was going to be adminiſtered, he had a very fetid diſcharge by ſtool.

That day he was better till night, when he grew very feveriſh.

The next day, having ſlept well the preceding night, and thrown up by coughing a little matter, he was much better.

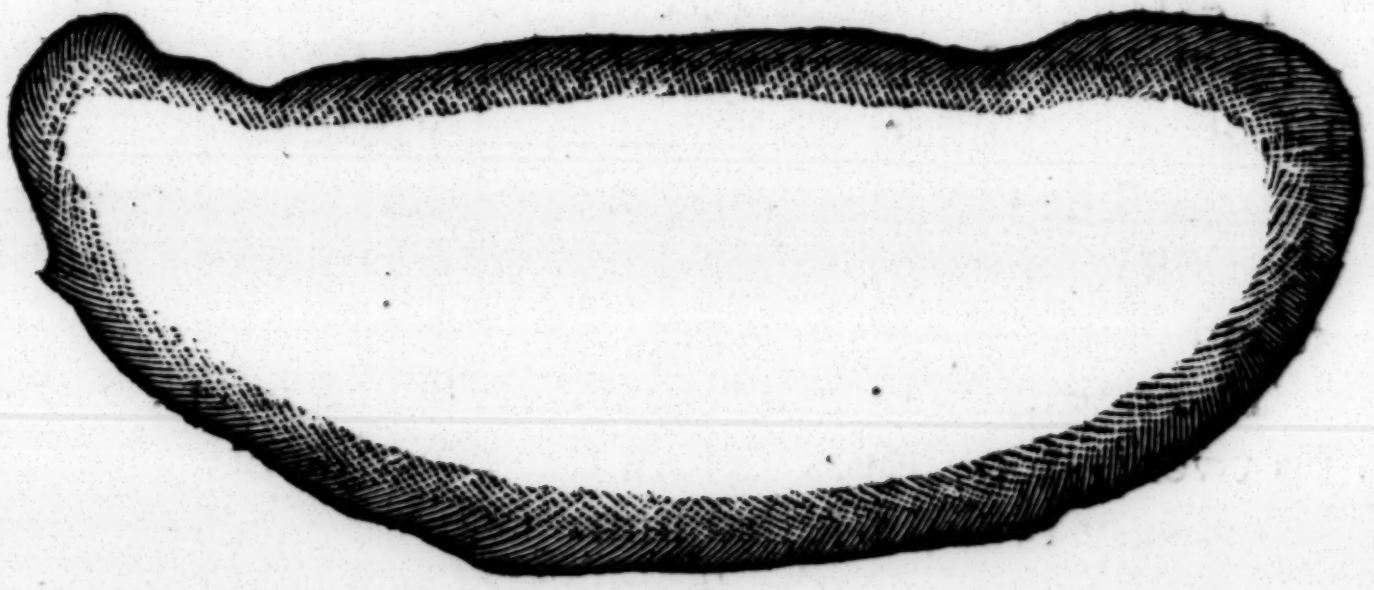
He began now to ſpeak with leſs difficulty, and for three or four days to recover gradually; but then ſuddenly grew worſe; his pulſe being very weak: his ſide, which grew worſe daily from the firſt, now reddened a little and ſwelled; to which I applied the emplaſter of gums. But all methods proved ineffectual, for the next day being ſeiz'd with cold ſweats and ſpaſms in the tendons, he ſoon expired.

Examining the body, and making an inciſion thro' the left abdomen, I found the diaphragmatic upper mouth of the ſtomach greatly inflamed and ulcerated, and the tunica in the lower part of the ſtomach burnt; and from the great cavity of it took out a great piece of lead of the ſhape and weight here deſcribed.

It will perhaps be thought difficult to explain the manner, by which the lead entered the ſtomach: But the account, which the deceaſed gave me and others, was, that as he was endeavouring to extinguiſh the flames, which were at a conſiderable height over his head, the lead of the lanthorn being melted dropped down, before he was aware of it, with great force into his mouth then lifted up and open, and that in ſuch a quantity, as to cover not only his face, but all his clothes.

Plymouth,
19 Dec. 1755.

The figure of the lead; which weighed exactly ſeven ounces, five drachms, and eighteen grains.



To the Right Hon. George *Earl of* Macclesfield, *Preſident of the Royal Society.*

My Lord, Plymouth, Jan. 30, 1756.

Read Feb. 5, 1756.

AS the late caſe I took the liberty of troubling your lordſhip with, was ſo very ſingular, as to make it by ſome gentlemen greatly doubted, on account of their imagining, that the degree of heat in melted lead was too great to be borne in the ſtomach, without immediate death, or at leaſt much more ſudden than happened in this caſe; I herein can not only convince your lordſhip of its fact, by my own and (if requiſite) the oaths of others, but alſo by the following experiments, which from ſimilarity of circumſtances muſt not only render that probable, but (in the moſt convincing manner) the abſolute poſſibility of my aſſertion.

I extracted in three pieces, from the ſtomach of a ſmall dog, ſix drachms one ſcruple of lead, which I had pour'd down his throat the day before.

N.B. The mucous lining of the œſophagus ſeemed very viſcid, and the ſtomach much corrugated, tho' its internal coat was no-ways excoriated.

The dog had nothing to eat or drink after; nor for twenty-four hours before the experiment, when, being very briſk, I killed him.

I alſo took from the ſtomach of a large dog (in ſeveral pieces) ſix ounces and two drachms of lead, three days after thrown in.

The pharynx and cardiac orifice of the ſtomach were a little inflamed and excoriated; but the œſophagus and ſtomach ſeemed in no manner affected.

I gave this dog an half pint of milk juſt before I poured down the lead; very ſoon after which alſo he eat thereof freely, as if nothing ailed him; which he daily continued to do, being very lively at the time I killed him.

From the crop of a full grown fowl, I (in company with Dr. Huxham, F. R. S.) extracted of lead one ſolid piece, weghing two ounces and a half, together with nine other ſmall portions, weighing half an ounce, which lead was thrown down the fowl's throat twenty-five hours before.

The fowl was kept without meat for twenty-four hours, before and after the experiment, eating (being very lively juſt before we killed him) dry barley, as faſt, and with nigh, if not quite, the ſame eaſe as before.

The mucus on the larynx and œſophagus was ſomewhat hardened.

The external coat of the crop appeared in a very ſmall degree livid; and the internal, ſomewhat corrugated.

The barley was partly in the œſophagus, tho' moſtly in the craw, which was almoſt full with the lead.

I took two ounces one ſcruple from the crop of another fowl, three days after the experiment, which fowl was very briſk to the laſt.

Allowing, for a further ſatisfaction, that the experiment be tried, it is requiſite in making thereof, that the melted lead be poured into a funnel, whoſe ſpout being as large as the throat of the animal

(whoſe

(whoſe neck muſt be kept firmly erect) will conveniently admit of, muſt be forced down the œſophagus, ſomewhat below the larynx, leſt any of the lead might fall therein; and according to the quantity, either by totally, or partly obſtructing the aſpera arteria, cauſe immediate, or a lingering death; which accidents happening, in my firſt experiments on two dogs, directed me to proceed in the above manner.

At preſent, I have a dog with lead in his ſtomach, which I intend to keep, to prove how long he may live.

My lord, your lordſhip may depend on it, that ſo far from my aſſerting any thing in the leaſt degree uncertain, that, as I always have, I always ſhall act with ſo much circumſpection and integrity (eſpecially in theſe tender points, where my character is at ſtake) as to be able eaſily to prove what I may aſſert, as in the preſent caſe, ſo very extraordinary, that ſcarce any of the faculty (unleſs particularly acquainted with me) would give credit to, till I demonſtrated it by the above experiments; which, I doubt not in the leaſt, will be ſufficiently ſatisfactory to your lordſhip, and to the honourable Society; to ſerve which venerable body, as much as lies in my power, will, at all times, give the greateſt pleaſure to,

My Lord,

Your Lordſhip's moſt obedient,

and moſt humble ſervant,

Edmund Spry.

A Letter of John Huxham, *M. D. F. R. S. to Mr.* William Watſon, *F. R. S. concerning the Caſe of the Man, who ſwallowed melted Lead.*

Dear Sir,

Read Feb. 5, 1756. I Think there are few things remarkable, in art or nature, in this part of the country, that do not, ſooner or later, come to my knowledge. Our worthy commiſſioner, Fred. Rogers, Eſq; ſent me the lead you mention, three days after it was ſaid to be taken out of the man (Hall) who was ſaid to have ſwallowed it. I immediately ſent for Mr. Edward Spry, an ingenious young ſurgeon, of this town, who attended this Hall during his illneſs, and extracted the lead from his ſtomach (as was reported) when dead. Mr. Spry ſolemnly aſſured me, that he did actually take the lead, that was ſent me, out of the man's ſtomach, and offered to make oath of it. This Hall lived twelve days after the accident happened, and ſwallowed ſeveral things, ſolid and liquid, during that time; and he ſpoke tolerably plain, tho' his voice was very hoarſe. And he conſtantly affirmed, that he had ſwallowed melted lead.

However, as the ſtory ſeemed very extraordinary, and not a little improbable, I did not chuſe to tranſmit any account of it to the Royal Society, as I could have wiſhed for more unexceptionable evidence; for Mr. Spry had no one with him, when he did extract the lead, but one woman, Philips, the daughter of Hall, and another woman, who were alſo in the houſe, not being able, as ſaid, to ſee the operation, but immediately called in after it, and Mr. Spry ſhewed them the lead. I ſent a very ſenſible gentleman

to

to enquire into this affair, and he had this account from them.

This Mr. Spry is, to the beſt of my knowledge, a perſon of veracity, and I think would not utter an untruth. But, what is more, laſt Wedneſday he brought me a live young cock, into the crop or craw of which, he had the day before poured ſomewhat more than three ounces of melted lead. The cock indeed ſeemed dull, but very readily pecked and ſwallowed ſeveral barley-corns, that were thrown to him. I had the cock killed and opened in my view, and in the crop we found a lump of lead weighing three ounces (leſs twenty grains), and ſome other little bits of lead. I make no doubt the cock would have lived ſeveral days longer, if it had not been then killed. There ſeemed a ſlight eſchar in the cock's mouth, occaſioned by the melted lead, and the crop ſeemed as if parboiled. This experiment is very eaſily made, and ſeems to confirm the probability of Mr. Spry's account.

I never diſpute a matter of fact, when I am fully convinced, that it is ſo; but I think it my duty to enquire narrowly into the circumſtances of it, before I admit it as ſuch. With reſpect to the preſent caſe, you now know as much of it as,

Dear Sir,

Your moſt faithful and

obedient humble ſervant,

J. Huxham.

Plym. Sat. even.
Jan. 31, 1756.

LXV.

LXV. *A farther Account of the Succeſs of ſome Experiments of injecting Claret, &c. into the Abdomen, after Tapping. By Mr.* Chriſtopher Warrick.

Read Feb. 12, 1756.

I Some time ſince did myſelf the honour to lay before the Society an account of an improvement I had attempted on the operation of tapping, by injecting the abdomen, after the lymph was drawn off, with aſtringents. This method proving ſucceſsful in the caſe of Jane Roman, (as mentioned in the Tranſactions, No. 472) I was in hopes ſome gentleman of better abilities, and larger experience, would have made further tryals; but having not heard, that any attempt this way hath been made by others, and having lately met with three inſtances, wherein my own endeavours have failed, I am under ſome doubt, whether, upon the authority of a ſingle inſtance, I have not been too ſanguine in my hopes concerning it; tho' the ſeeming reaſonableneſs of ſuch a ſcheme, and the good event of it, under the very particular circumſtances of that woman, ſtill plead ſtrongly with me in its favour.

The firſt is that of the poor woman at Cubert, mentioned in the *Tranſactions*, No. 473, who was injected with claret and Briſtol water, and about a week after the operation died ſuddenly. She was upwards of fifty years of age.

The ſecond inſtance is that of a young woman of St. Kivern, who was about twenty-five, and had been three times tapped in the common way. Here we

made uſe of two punctures, according to Dr. Hales's method, as recommended in the *Tranſactions*, N°. 478, and claret and tar-water for the injection; which was conveyed into the abdomen thro' one canula, whilſt the dropſical lymph paſſed off thro' the other. A few hours after, ſhe complained of much pain in her bowels, and on drawing off the whole contents at once, ſhe fell into a ſyncope, in which ſhe remained till about twelve o'clock of the next day, when ſhe died. It may not be amiſs to mention, that her breath was immediately affected by the tar-water, and the ſmell of it continued to her death.

The third inſtance being ſomewhat ſingular, I beg leave to relate it in all its particulars. In March, 1752, I was called to Fluſhing (a ſmall town oppoſite Falmouth) to attend the tapping a poor woman, who was about forty years of age, and laboured, as was imagined, under an aſcitical dropſy, occaſioned by a ſuppreſſion of her menſes, that happened about twelve months before. She had been told of my ſucceſs with Jane Roman, and deſired my aſſiſtance, together with Mr. Rice, Mr. Cudlip, and Mr. Lillicrap, of the ſame profeſſion. She was a married woman, of a chearful temper, had never had a child, and, to all appearance, was a proper ſubject for the operation, ſhe being never thirſty, and her extreme parts being of the natural ſize: the abdomen was likewiſe evenly and equally diſtended, and of a great magnitude; but the fluctuation was not altogether ſo manifeſt as might have been expected. From theſe circumſtances we made no difficulty to reſolve on the operation, and determined to try, at the ſame time, the efficacy of a ſubaſtringent injection. A

ſuffi-

ſufficient quantity therefore of claret and Briſtol water being got ready, Mr. Rice, whoſe patient ſhe was, made the puncture; but on withdrawing the perforator, inſtead of lymph, nothing but a thick, ropy, gelatinous fluid came thro' the canula, in colour reſembling red port wine, or rather grumous blood. The ſingularity of this did not however alter our meaſures. Two gallons of it were immediately drawn off, and half that quantity of claret and Briſtol water injected in its ſtead. This we purpoſed to have repeated the next day, and as the circumſtances of the patient would admit; and to continue daily, till the whole contents ſhould be gradually diſcharged; fearing that a total diſcharge in the ordinary way would have brought on a ſyncope. But when we attended her again on the day following, not one drop of any fluid came thro' the canula; and a ſecond and a third puncture was attended with no better ſucceſs. Soon after this, the whole abdomen became painful and diſtended, frequent rigors came on, and a delirium, in about twelve hours, carried her off. Upon opening the body the day following, not one drop of any fluid was found in the cavity of the abdomen; an enormous cyſtis, which might have contained, when. full, about ſix gallons, having completely filled the whole extent of it. There were likewiſe attached to the coats of it five large bodies of fungous fleſh, the leaſt of them bigger than a man's fiſt. Each of theſe, when cut open, appeared to be divided into cells, full of white glutinous pus. This extraordinary maſs adhered only to the fund of the uterus, and together with it, the fungous ſubſtances, and vagina, when taken out, intirely covered a middle ſized pillar

and claw tea-table. We now found, that in the night the canula had accidentally ſliped out of the cyſtis; and that the operator, in making the ſecond or third puncture, had fallen upon one of theſe fungous bodies, which gave occaſion to the above-mentioned diſappointment. On proceeding to a farther examination of the abdomen and thorax, we found every thing ſound, and in its proper ſtate, excepting the poſterior part of the right lobe of the lungs, which was full of purulent matter, and adhered to the pleura. I ſhould add, that the ovaria did not diſtinctly ſhew themſelves, ſo as to ſatisfy any enquiry about them; but this perhaps might be owing to the hurry or inaccuracy of the diſſector.

Whether theſe miſcarriages are ſufficient to diſcredit a method of practice, which hath the appearance of being the moſt rational one yet found out for handling a dropſy, I leave to the determination of better judges. The frequent miſcarriages, that happen in the ordinary way, ſeem ſufficient to juſtify every attempt to render the ſucceſs of it leſs precarious. If any further tryals of it be made, I would beg leave to recommend its being done before the viſcera are too much injured by the dropſical lymph; and if the evacuation be made at different times, with a view of preventing a ſyncope, (as was propoſed in the laſt inſtance) that brandy, or ſome ſuch liquor, properly diluted, be made uſe of inſtead of claret, which, as I apprehend, by the heat of the body, may be apt to turn ſour. It may be likewiſe proper, that the head of the patient, during the evacuation, lies lower than any other part of the body.

As

As in the ſecond inſtance above-mentioned, tar-water had been recommended by ſome gentlemen of the profeſſion, then preſent, inſtead of Briſtol-water, I, ſome time after the death of the patient, injected a pint of it warm into the belly of a ſmall cur, to ſee how far the effect of it differed from that of claret and Briſtol water. The dog immediately fell into great agonies, and in about two hours died. The abdomen being opened, all the inteſtines were found greatly inflamed. I then tried claret and Briſtol water, alſo port wine and fountain water, on other dogs, after the ſame manner. Each of theſe injections was retained with little or no inconvenience, except intoxications: and in forty-eight hours the dogs became well again, the injection being intirely abſorbed. It occurred to me, in making theſe experiments (wherein the power of abſorption ſeemed very conſiderable) how far it might anſwer in preventing a ſyncope, or for other purpoſes, that a fit quantity of a properly adapted injection be left undiſcharged, after tapping, which might be either abſorbed, or drawn off at proper intervals, as the ſtrength of the patient may admit. I am, with great reſpect,

S I R,

Truro, Jan. 21, 1744.

Your moſt humble Servant,

Chr. Warrick.

LXVII.

LXVI. *An Account of the late Diſcovories of Antiquities at* Herculaneum, &c. *in Two Letters from* Camillo Paderni, *Keeper of the Muſæum* Herculanei, *to* Thomas Hollis, *Eſq*; *Tranſlated from the* Italian *by* Robert Watſon, *M. D. F. R. S.*

An Extract of a Letter from Camillo Paderni, *dated at* Naples June 28, 1755.

HIS majeſty the king, my maſter, is always increaſing his taſte for matters of antiquity, which he loves with the zeal of the moſt paſſionate antiquary; for he not only makes all the neceſſary trials and inquiries in theſe cities, which have been covered by mount Veſuvius, but extends his reſearches into other parts of his kingdom; and buys alſo, with great pleaſure, every piece of antiquity of value, that he can meet with. Fortune ſeconds his endeavours, and makes him at this day one of the happieſt virtuoſi in Europe; and we may ſay, that he hath no ocaſion to take pains to ſeek for good fortune, for ſhe always attends him; as Sir, you, may ſee in the following inſtance. In April, his majeſty was acquainted, that a little beyond La Torre della Nunziata, where ſtood the ancient Pompeii, in digging near the amphitheatre, there was diſcovered a marble capital of the Corinthian order, and that it was neceſſary to examine farther into what might be there. His majeſty had formerly cauſed ſome workmen to dig in this place, but upon account of a certain vapour or memphites, which aroſe here, and which was ſo active, as to deſtroy any one, who remained ever ſo ſhort a time

time in it, his majeſty ſuſpended the work: but being aſſured, that this vapour had ceaſed to ariſe, he ordered one of his engineers, who had viſited the place, to make the neceſſary trials to begin again. Immediately there were found two pilaſters of white marble about ten feet high, fluted on every ſide, with capitals and baſes of the Corinthian order. On one ſide of theſe pilaſters they have found a ſeries of nine other pilaſters about ſeven feet high, equally wrought with the larger: there were likewiſe five other pilaſters on the ſide of the other great one, which in all will amount to ſixteen; and are of one piece, excluſive of the capital and the baſe, except one, which is compoſed of two pieces. They were all excellently preſerved, and were ſtanding; forming a portico before a building; the nature of which I cannot undertake to explain, becauſe I do not care to commence author from the relation of others, before I have examined things with my own eyes. I can only write what I have ſeen. When I was there, little was diſcovered, and I have not ſince had an opportunity of going thither on account of my bad ſtate of health. By this one view I could perceive, that this was a great ſquare building. All the buildings, which are in Pompeii, are of the ſame conſtitution with thoſe of Herculaneum and Stabiæ; that is to ſay, of one ſtory. I did not ſee the whole of the ſuppoſed front of this fabric, and ſo cannot determine deciſively about it, till the whole be cleared by digging. The portico is continued on the ſides, but the pilaſters are not of marble, but of brick covered with ſtucco, and coloured with green, and are not fluted like thoſe of marble. One then only of the ſides is yet undiſcovered, and we muſt wait to

ſee the ſide oppoſite to the front, and the rooms within, to be able to ſpeak deciſively. But to return and ſpeak of the front; I can tell you, that it was all painted in the groteſque manner; but little, and that ill preſerved, remains. There were no ornaments of ſtucco, or marble; the walls indeed were coloured, and there were ſome ſmall niches formed in the walls, each of which correſponded to one of the pilaſters, and conſequently there were eighteen in number. In ſeveral of them were found certain figures, ſome of earth, others of marble, in this order; firſt was placed one of marble, then one of earth: thoſe of marble were 9 ſmall Hermæ, among which there is a Hercules crowned with oak, ſome ſatyrs, fawns and Bacchantes. Two of them are of the old red, and the other of the old yellow marble, and are of an indifferent ſtyle. Thoſe of the baked earth conſiſt of four figures. The firſt is a Barbarian king, who ſtands erect with his right hand under his chin in a penſive manner, and wears his chlamys claſped with a fibula upon his right ſhoulder. But what makes this figure the more curious is, that the whole body forms a vaſe, on the back of which there is a handle to hold it by. Behind the head there is a little tube, through which water or ſome other liquor was poured in, and the mouth of the figure is open, through which the liquor was poured out. The hight of it is about ten inches, and the ſtyle rather low. The ſecond figure is of the ſame hight and character, as to the workmanſhip; but what it repreſents, renders it ſingular. I will content myſelf with deſcribing its action and its ornaments, and leave to others the explication of the

reſt. This figure ſeems ſitting with its legs ſtretched out, which are diſtorted like thoſe of ſome dwarfs. It has a great head; the mouth, eyes and noſe of which are extremely overcharged. It is dreſt in the prætexta. Upon the breaſt there is the bulla aurea, the ſtring of which ſurrounds its neck, and is held with the right hand; with the left it holds the tablettes called pugillares, on which the ancients placed wax, and wrote on it with a ſtyle. Theſe pugillares are exactly like thoſe, which I dug up at Herculaneum, and which I preſerve in that muſeum. Beſides it bears a great Priapus, and behind is ſeen the breech. This was made for a veſſel, ſuch as that deſcribed above, except that beſides that the mouth of this figure is pierced, the liquor can alſo be poured from the Priapus. The third figure is intirely like to the preceding, except its dreſs, which is ruſtic, and bound round the waiſt with a cord, to which there is faſtened ſomewhat, that cannot be made out, but which appears to be a little caſe to hold ſomething: the reſt is not overcharged, but is ruſtic. It holds in its right-hand a loaf, and its left hand is covered with its dreſs, and, like the other, it ſhews its breech and Priapus. I am of opinion, that ſuch veſſels were uſed for drinking, the liquor coming out of the Priapus, this being not unuſual with the antients, as Juvenal, in his ſecond ſatyr, gives us to underſtand; *Vitreo bibit ille Priapo.*

The laſt figure repreſents the Roman charity. She is ſitting, and with her left hand embraces her father, and with her right preſſes the breaſt which her father ſucks; who is expreſſed in this figure totally emaciated. This doth not, like the others, form a veſſel,

but ſimply exhibits the ſtory. The ſtyle is moderate, its hight near the ſame as that of the others. It is to be obſerved, that this laſt groupe is covered with a varniſh or glazing, like that which covers earthen plates and things of that kind. There were found in the before-mentioned niches two little buſts of baked earth, of the ſame hight; one wants the head. This is all that is found in that part of the building, which I ſuppoſe to be the front.

There is no doubt but that formerly others have dug at Pompeii, and particularly in this very ſpot, which the miners, who are expert and faithful, have perceived. As our miners had at firſt great ſkill and diligence, ſo they are become by time more perfect, inſomuch that none can execute better that which they do, particularly in digging at Herculaneum, where they never ſee the light, but at the hours ſet apart for reſt. Theſe were the firſt, who diſcovered, that others formerly had dug more, by certain ſtrokes, the marks of which remain on ſome of the pictures, which are on the walls of that chamber, which was the ſecond that they diſcovered.

Their opinion is confirmed by the matter, which fills up the ſaid chamber, not being in the ſame ſtate that it uſually is. So that we may conclude, that they have formerly dug here, but irregularly; fortune having a mind to reſerve the beſt part for the king my maſter. There are ſeveral pieces of painting cut out, which cannot yet be well ſeen, becauſe they are in their caſes.

If thoſe, who before his majeſty dug in this place, had done it regularly, in my opinion they could not

have miſſed a treaſure, which is found in a little cloſet, the dimenſions of which are about ſix feet in length, and four in breadth, diſcovered the 13th of laſt month. In this place was found a very fine tripod about three feet high, extremely well preſerved. In ſhort, it is one of the moſt beautiful pieces of antiquity in the whole world. It is formed of three ſatyrs, young, and all exactly alike. Their heads are moſt beautiful, with a chearful countenance, and the hair well diſpoſed with a ribband, that ſurrounds the head. Upon the forehead there ſtand two ſmall horns, which are united. The right hand reſts upon the ſide of the body, and the left is open, with the arm ſomewhat extended. They have a great ſatyreſque priapus. The legs are united, and they place their feet upon round baſes, which have been turned in a lathe, and then covered with leaf ſilver. Their tails are twiſted round a ring, which is ſuſpended thereby. The three ſatyrs ſupport with their heads the hearth of the tripod, which is of excellent workmanſhip, and hath three moveable rings, which ſerve to remove the tripod from one place to another. One of theſe rings is wanting, and could not poſſibly be found. Whence we may ſuppoſe, that anciently it was likewiſe wanting. Upon the hearth there is another ornament united to its circumference, and forming a kind of radiated crown, which crown hath alſo two handles, but not moveable. Theſe ſerve to place the crown upon the hearth. Among other particularities, it is obſervable, that the bottom of the hearth is not of braſs, like the reſt of the tripod, but of baked earth. The above-mentioned cloſet, where this tripod was found, is all painted, and intire, with the

cieling unhurt. In the walls of it there was a table of white marble faſtened in the wall itſelf, which we might call a ſide-board, and which was extended along the ſweep of the room. Upon this table was found a creſcent of ſilver, about 5 inches in diameter, and on the edge of its middle there are two ſmall holes to receive a ſtring to ſupport it. Perhaps this was an amulet, for we have another of the ſame metal, but ſmaller, with its ſupporter of ſilver, which hath been long found. Upon the ſame table there was another amulet of ſilver about an inch in hight, which repreſents Harpocrates. This figure hath its finger near its mouth, the lotus on its head, and wings on its ſhoulders. On the right ſhoulder hangs a quiver, and its left arm holds a horn of plenty, and leans upon the trunk of a tree, round which there is a ſerpent, and at the foot of the trunk there ſtands an owl. There was found a kind of fibula, for ſuch I take it to be, which is of gold, and is extremely well preſerved. Its form is round, and made like a great button. On the back there is a gold wire faſtened to one ſide; the other end of which is faſtened in a ſmall piece of gold, that is ſoldered into the fibula. The whole is little more than an inch in diameter. There are found alſo two other figures; one is of marble about a foot high, and repreſents a woman; it is of no great value: the other is of ivory, but there remains nothing but the name, and a part of the face, by which may be perceived, that it is the work of an excellent Greek hand. All the reſt conſiſts as it were of minute leaves, which are ſo brittle that they cannot be united. Its hight is about a foot.

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What I am now going to deſcribe, was found in the ſame cloſet, upon the ſame marble table, and is one of the moſt beautiful ſtatues, which I ever ſaw, and ſo admirable, that I know not how to begin to deſcribe it. I will firſt tell you its hight, which is little more than three inches, that you may conceive what pains have been taken with it. It ſtands upon its feet and is quite naked, and repreſents a Priapus, which is not ſatyreſque, with a moſt perfect contraſt of attitude, One obſerves through the whole figure a moſt perfect ſkill in anatomy, where the ſmalleſt muſcle is not loſt, and at the ſame time it ſeems not dry or hard, but palpable fleſh. It is of a noble and excellent ſtyle. Its head is ſomewhat ruſtic, with a goat's beard and ears. It hath a laughing countenance, turning its head with much grace, and brings its firſt finger of the left hand to its face. It extends and raiſes its right-arm, which terminates in a manus impudica. Our Neapolitans and I have ſeen the ſame in our peaſants about Rome, who frequently wear in their hair a pin, the head of which conſiſts of ſuch a hand; and they ſay, that they wear this againſt an evil eye; and in Naples I ſee ſome of theſe pins worn by children. We have found ſeveral of theſe ſmall hands at Herculaneum. It is obſervable, that theſe Priapi frequently had this hand; for among the many, which remain under my care, there is one with human ears, and with this hand, which together with the whole arm forms a Priapus. But let us return to our figure. The head is covered with a cap, which is folded down behind; and its baſe is low and round, and well fitted. In fine this may be called one of the moſt excellent curioſities.

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In one of the other rooms there was a fine pair of ſcales, in which there are ſome remains of the ſtrings made of a kind of fine coral, and the ſtrings remain in ſome of the rings. There were found likewiſe many veſſels of earth and fragments of metal.

In the ancient Stabiæ they go on digging; but it is long ſince any thing of value hath been found, except that in the beginning of this month two ſmall ſtatues of braſs were diſcovered. One repreſents a Venus, but of no value. The other a Panthea with a rudder, horn of plenty, lotus, modius, and ſickle. It is but of ordinary workmanſhip. Many vaſes of earth, ſome of glaſs, have been found. A great veſſel of copper with a handle, a ſingular funnel, a beautiful little vaſe of rock-cryſtal with its cover, and a ſimpulum or ewer, divers medals, as well ſilver as copper, well preſerved, but common, and various pieces of leaden pipes, have alſobeen found there.

The ſame may be ſaid of Herculaneum; for ſince the month of March, after the coloſſal buſt of braſs was found, they have diſcovered nothing of value except one thing, which ought to make much noiſe among the learned, and which I believe to be the only one of its kind in the world. This is a little leg and thigh of metal covered with ſilver, and which is five inches long. Upon the external part of it is deſcribed a ſun-dial formed upon a quadrant, and as the thigh forms a quarter of a circle, the workman hath taken the center of this quadrant from the extremity or leg of the gammon, and hence hath drawn hour-lines, which with the lines, that mark the months, form the uſual compartments, ſome larger and others ſmaller, which are divided ſix by

ſix,

ſix, as well in hight as length. Below the inferior compartments, which are the leſs, are read the names of the months placed in two lines in a retrograde order, ſo that the month of January is the laſt in the firſt line, which bears the other five following months. In the ſecond line are deſcribed the ſix other months in their natural order; ſo that the month of December is under January, and ſo the months ſhorter and longer, two and two, have one common compartment for each couple. Almoſt on the edge of the right ſide, there is the tail of the animal ſomewhat bent; and this performs the office of the gnomon. On the extremity of the bone, that is, of the leg, or center of the quadrant, there is a ring to hold the dial in an equipoiſe; and it is ſuppoſed, that in that place was faſtened its plummet, ſuch as in the like dials is to fall upon the preſent month to determine the ſhadow of the gnomon upon the horary lines. It is obſervable alſo, that as theſe dials were deſcribed upon a plane ſurface, according to a fixed rule, the ſurface of this metal ham being in one place concave, in another convex, one cannot eaſily gueſs what rule the workman uſed to deſcribe a dial of ſo difficult a kind, upon a plane ſo irregular. This dial was found the eleventh of this month, and was delivered to me; but it was not known what it was, becauſe it had a cover upon it, ſo that the miners took it only for a piece of iron. My curioſity ſoon led me to examine it. I begun to diſcover the ſhape of a ham, however I could not perſuade myſelf, that it was ſo; but afterwards finding, that it was ſilver, and perceiving the lines, which form the compartments, and the cha-

characters, which denote the twelve months, I had no doubt about it. I was ſo pleaſed with ſuch a diſcovery, that I went directly to the royal garden, where the king and queen were, to whom I preſented it, and to whom it gave great ſatisfaction. This is all that hath been found in theſe three places, by digging, ſince my laſt letter dated in march.

I muſt not neglect to acquaint you with what hath been found in a trial, which his majeſty made at Cuma, where were ſituated ſome ſepulchres, which afforded many curious things; an account of which you will not be diſpleaſed to read. In May laſt, our miners opened a tomb of the family Pavilia, which formed a ſmall chamber. On the floor there were three corſes, or rather their bones, which were included in four pieces of the piperine ſtone. Theſe four ſtones formed for each corps an oblong caſe. The engineer, who was preſent at the diſcovery, told me, that one of theſe bodies was all covered by a ſubſtance unknown to him; but from his relation I comprehended what it was. The corps was covered with a cloth of amianthus, which, as it was large, remained in this ſituation all on a heap, but calcined by the ſalts of the earth, for which reaſon it was neceſſary to take it up in pieces, it being become extremely brittle. However, to be more ſure of my opinion, I had a mind to try it in the fire, where it remained unchanged; whence there is no doubt but that it is amianthus. There were found a great many little pieces of paſte as big as beans, which were taken by the miners for confits, but are the confection, which uſed to be put upon dead bodies. They are compoſed of myrrh and other ſpices, and

even

even now retain a very ſtrong ſmell. There was found ſome cloth reduced almoſt to nothing, which had ſome ornament of gold embroidered upon it, or rather wove into it, as is more probable from the gold thread. Upon the above-mentioned body were found ſome pieces of paper, for I have great reaſon to think it ſuch from the trials, which I have made upon the old papyrus, of which we have about eight hundred volumes. Now I think theſe pieces to be paper, becauſe they are compoſed of a matter, which is like that, of which our paper is made; but however I will not pretend to be quite ſure; I only plainly give my opinion. This paper on one ſide is coloured with red minium, on the other it is black. Perhaps they uſed this ſort of paper to write upon, to denote by the colours the happy or unhappy ſtate of the writer. Ovid gives us an example of this in the firſt elegy of the firſt book *De Triſtibus*.

Nec te purpureo velent vaccinia ſucco,
Non eſt conveniens luctibus ille color:
Nec titulus minio, nec cedro charta notetur,
Candida nec nigrâ cornua fronte geras.

I think I may with reaſon judge theſe fragments to be paper; but I always am ready to ſubmit to the opinion of the more learned. But as every one may ſpeak his thoughts, ſo I have ſpoken mine. Beſides this paper there were found a mirror of metal, and three teſſeræ, which we call dice. Under the corps or bones was found a padlock, through which were paſſed three iron ſtrigils, and another that was broken. It is remarkable, that in all the other ſepulchres, that were opened at Cuma in the month of

May, there were found a mirror, three teſſeræ, ſtrigils, and ſome very ſmall fibulæ of bone. In the above-mentioned ſepulchre was found a ſmall lectiſternium, or rather pulvinar deorum, which was very much decayed. It is mounted in iron. The ornaments, which compoſe it, being of ivory, the ruſt of the iron hath as it were deſtroyed the whole. So that there were collected but a few remains of the four pillars, ſome pieces of the bands, which went round the frame, eight pieces of ivory, of an oblong form, in each of which was engraved a figure of ſome unknown deity, all of the ſame deſign, but in a bad ſtyle; and two heads of a horſe, which are fellows, and belong to the lectiſternium, not unlike that great one of braſs, which is now in the royal muſeum. There were found alſo ſeveral little vaſes of earthen ware, whoſe form is this: They have a long neck, with a mouth proportionably ſtreight; the body is oval, which towards the bottom is ſo ſmall, that they cannot ſtand upright. The misfortune is, that two of theſe vaſes, which are of oriental alabaſter, and of the moſt excellent workmanſhip, are both broken in the middle.

Near this ſepulchre there was opened another, belonging to the freed men of the Pavillia family. There we found many glaſſes and pieces of earthen ware, and two moſt beautiful earthen lamps. On one of them there is an Hercules going to ſlay a ſerpent with his club, which he holds in his left hand. On the other, there is a prieſteſs of Bacchus, which in one hand holds the ſacrifical knife, and in the other the half of a victim. Beſides there are two very ſmall wine-glaſſes, which contain, the one a liquor of the

colour

color of red wine, the other a liquor more limpid than white wine, but without any ſmell. In this tomb were found likewiſe the uſual dice, ſtrigils, mirrors and fibulæ. The bones and aſhes were in urns made of earth.

Four other ſepulchres alſo have been opened, in all of which were found the uſual ſtrigils, mirrors, teſſeræ and fibulæ. In one of them was found a little earthen urn with its cover. Within the ſame tomb there was a ſmall urn of glaſs elegantly made, containing the aſhes of a child. Near the ſaid urn were found ſeveral little things, which probably were the playthings of the child; theſe were two very ſmall goblets of baked earth glazed, with a handle to each; two ſmall water-ewers, of the ſame materials, with ornaments; theſe alſo are extremely ſmall: another vaſe of common earth, which forms a recumbent ox, on the back whereof there is a hole to receive the water, which was poured out through the mouth; and there is a handle on one ſide of the body. In this ſame ſepulchre was found a monſtrous Priapus of red earth. This figure hath wings, and is much over-charged. All theſe things, which I have deſcribed, are preſerved by me in the royal muſeum, in a ſeparate apartment from, that, in which is preſerved what hath been found at Herculaneum, Pompeii, and Stabiæ. I have already filled eight chambers with antiquities; and becauſe thoſe are not ſufficient, I ſhall begin to place many other things, which hitherto I have been forced to keep in confuſion, in other chambers, which are on the ſame floor. I hope to have the pleaſure to ſee you again in Italy, to admire this treaſure, with the ſole care of

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which his majeſty hath been pleaſed to honour me. A ſingle volume of the Papyrus is unfolded, which is that, which treats of muſick. At length the name of the author, who was called Philodemus, is found written twice, at the end of the piece. The name is written once in a ſmall, and a ſecond time in a large hand, and in a good Greek character. They are now beginning to open, or rather to unroll another manuſcript; but hitherto without much ſucceſs: From ſome fragments one may collect, that it treats of Rhetoric.

This is what I have to ſay at preſent; and for the future, I will not fail to write to you, whenever any thing of value ſhall be found. I am ſorry to ſend you a letter full of blots and ill expreſſed; but, my friend, I have taken up my pen and ſtolen a little time to write haſtily to you; for I have ſo much buſineſs, that ſometimes I have not even time to dine; ſo I hope you will excuſe me.

Dr. Watſon *begs leave to make the following Obſervations.*

I think it probable, that Philodemus, the author of this treatiſe on muſic, was the Epicurean philoſopher of that name, who was, as Strabo informs us, a native of Gadara in Syria. He wrote many pieces in proſe and verſe, and his tenth book περι των φιλοσοφων συνλαξεως is quoted by Diogenes Laertius. Indeed his ſect, time and abode, will allow of the ſuppoſition of his writings on muſic being at Herculaneum at the time of its deſtruction. He reſided at Rome, and was the acquaintance of Tully, and the

pre-

preceptor of Lucius Piſo the conſul. We learn from Aſconius Pedianus, that it is Philodemus the Epicurean, of whom Cicero ſpeaks with that admirable mixture of praiſe, and invective, and excuſe, in his oration againſt Piſo; wherein he ſays, that he knew him to be a man of elegance and polite literature: That it was from him that Piſo learned his philoſophy; which was, that pleaſure ought to be the end of all our purſuits: That indeed the philoſopher did at firſt divide, and diſtinguiſh the ſenſe, in which that maxim was to be underſtood; but the young Roman perverted every thing to make it favour his inclinations and pleaſures; and the Greek was too polite and well bred to reſiſt too obſtinately a ſenator of Rome. He then tells us Philodemus was highly accompliſhed in philoſophy, as well as polite literature, which other Epicureans were apt to neglect: That he wrote verſes, which were ſo ſweet, ſo elegant, and ſo charming, that nothing could exceed them: That he was betrayed into a too haſty friendſhip with Piſo, from which he could not diſengage himſelf without the imputation of inconſtancy; and that *rogatus, invitatus, coactus, ita multa ad iſtum de iſto ſcripſit, ut omnes libidines, omnia ſtupra, omnia cænarum conviviorumque genera, adulteria denique ejus, delicatiſſimis verſibus expreſſit.*

I have met with ſome epigrams of Philodemus yet extant, ſome of which are, in my opinion, moſt facetious and elegant. We might have had many more, had not Planudes, as the Scholia informs us, rejected ſuch out of his collection, as he thought too looſe and voluptuous. Horace ſeems to have had ſome of theſe epigrams in his eye more than once, when

when he wrote his ſecond ſatyr of the firſt book; particularly where he ſays,

—Hanc Philodemus ait ſibi, que neque magno
Stet precio, nec cunctetur, cum eſt juſſa venire.

Is not this almoſt a tranſlation of the

καὶ παρέχουσα
Πάντα, καὶ αἰτῆσαι πολλάκι φειδομένη.

I will give the whole epigram, as a ſpecimen of the ſtyle and manner of Philodemus; but muſt beg, that in reading the third verſe you would recollect what Homer ſays of the girdle or ceſtus of Venus, that it contained all kinds of delights and blandiſhments, love, perſuaſion, and deſire.

Φιλοδήμου ἐπίγραμμα.

Μικκὴ καὶ μελανοῦσα Φιλαίνιον, ἀλλὰ σελίνων
Ὀυλοτέρη, κ' ἀμνοῦ χρωτὰ τερεινοτέρη,
Καὶ κεστοῦ φωνεῦσα μαγωτέρα, καὶ παρέχουσα
Πάντα, καὶ αἰτῆσαι πολλάκι φειδομένη.
Τοιαύτην στέργοιμι Φιλαίνιον, ἄχρις ἂν ἔυρω
Ἄλλην, ὦ χρυσέη Κύπρι, τελειοτέρην. *

Upon the whole, I think we may hope for much entertainment from reading this new-diſcovered piece on muſic; and tho' the ſubject, on which it is written, may not be in all its extent perfectly underſtood, yet we may indulge ourſelves in the agreeable expectation of finding, in a treatiſe compoſed by Philodemus, learning, wit, and fine writing.

Extract

* Since the death of the very learned Dr. Watſon, which happened March 2, 1756, ſoon after his tranſlation of theſe two letters of Camillo Paderni, and his obſervations upon the former, were read at the Royal Society, another Epigram of Philodemus has been taken notice of, publiſhed at Leipſic in 1754, by the celebrated

Extract of a Letter from Camillo Paderni, *dated at* Naples, July 29, 1755.

Read 12 and 19 Feb. 1756.

THE principal reaſon of my writing to you at this time is a cameo of great excellence found the 9th of this month, in the morning, while their majeſties were at table, where I preſented it to them, to whom it gave great ſatisfaction, and was extremely admired by all the nobility who were preſent. This cameo is in alto relievo. It is about an inch and a half long, and almoſt as much in breadth. It repreſents a half-length of Ceres. The head is in profile, and hath a noble and beautiful air. It is turned, together with the body, a little to the left. The left arm is a little raſed, and holds in the hand ſome ears of corn. The right arm is lower, and cloſe to the body. The

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lebrated Mr. Reiſke, which appears likewiſe to have been alluded to by Horace, in the paſſage in part cited above from his ſecond ſatire of the firſt book. ver. 120.

Illam poſt paullo, ſed pluris ſi exierit vir,
Gallis: hanc Philodemus ait, ſibi, &c.

Upon which Dr. Bentley has the following note:

Gallos hic ſpadones et Cybeles ſacerdotes accipio; qui tam lentas ambages facilé et patienter ferre queant. Si Philodemi epigramma ex angulo aliquo erueretur, tum certius ſcire poſſemus utrum Γάλλους *vellet an* Γαλάτας. The epigram is as follows:

Εἰνὶ μύχοις κραδίας σοὶς περιθάλπω ἔρωτας,
Τὸν μὲν Ρωμαΐδος, τὸν δὲ Κορινθιάδος.
Ἡ μὲν ματρώνας τε τρόπους, καὶ ἤθεα σέργειν
Οἶδ' ἀπὸ κεκρυφάλου μέχρι περισκελίδων.
Ἡ δὲ χύδην παρέχει πάσῃ φιλότητι πρωσηνῶς
Πλασσαργώσα τύπους τοὺς Ἐλεφαντιάδος.
Ἂν δὲ μίαν ταύταιν, Πείσων, μ' ἄιρειν ἐπιτέλλεις,
Ἐν Εφύρῃ μίμνω, τὴν δ' ἄρα Γάλλος ἔχοι.

right

right hand takes hold of part of a fine garment, or ſhift, with which the figure is in part covered. The head is adorned with a diadem; and the hair, which is of excellent workmanſhip, flows upon her ſhoulders, tied with a ſingle ribband, which reſts upon her neck. The ſtone, of which the head is compoſed, is pellucid, and the reſt of the figure is cut out of a chalcedony by a Greek maſter: it was found at Stabiæ, where they continue to dig. In the ſame place were found alſo buried ſeveral vaſes of metal and glaſs very well preſerved.

At Pompeii within theſe few days was found a moſt beautiful wine-ſtrainer, ſmall, but finely pierced, in a better taſte than thoſe already found, which are of braſs. In this ſame place was dug up an ink-ſtandiſh, with ſome of the ink, which I likewiſe preſerved. There hath been met with likewiſe an iron ax. There have been found, and they go on daily to find, many pictures. If the ancients had not dug in this place, we ſhould have diſcovered many more things; for we find that they have taken away even ſome of the pictures. At Herculaneum, tho' they go on digging, nothing hath been met with for ſome time: we do not therefore deſpair, but go on with the work as before; for it hath often happened, that one fortunate day hath made amends for the preceding want of ſucceſs. It is enough, that this royal muſeum is continually increaſing; and whether it be from Herculaneum, or Pompeii, or Stabiæ, it is always a great ſatisfaction to his majeſty, and to the learned world. When any thing elſe of taſte and value is diſcovered, I will not fail to give you an account of it in the ſame manner as I have begun.

LXVII.

LXVII. *An Account of the Earthquake felt at* Glaſgow *and* Dumbarton; *alſo of a Shower of Duſt falling on a Ship between* Shetland *and* Iceland; *in a Letter from Dr.* Robert Whytt, *Profeſſor of Medicine in the Univerſity of* Edinburgh, *to* John Pringle, *M. D. F. R. S.*

Read Feb. 19, 1756.

THE earthquake at Glaſgow and Greenock happened in the night between the 30th and 31ſt of December, nearly at the ſame time. It was felt at Glaſgow, as I am informed, by almoſt every perſon that was awake, and out of bed, and alſo by ſome in bed, who were not faſt aſleep. There were, according to moſt accounts, three ſucceſſive ſhocks, or riſings as it were of the earth. It was felt not only at Glaſgow and Greenock, but alſo at many other places in the neighbouring country; particularly at Dunbarton; as you will ſee by the copy of a letter I ſend you incloſed, which gives a more particular account of the earthquake there than I have been able to procure from Glaſgow.

SIR, Dunb. Jan. 17, 1756.

IN anſwer to yours relating to the earthquake felt here, there happened but one ſhock, and that very moderate, on the 31ſt of December, before one o'clock in the morning. The agitation was very ſen-

ſibly perceived by ſome who were in bed, and by Mrs. Weir and others who were ſtill up. It had a ſenſible effect upon ſome birds in cages, and tame fowls; they ſeemed both alarmed, the firſt fluttering very much, and the latter making a croaking noiſe, as in a great fright. It ſhook the board out of one cage, and ſpilt the water which was in the glaſs. It was equally felt by thoſe, who lived in ground-floors and in the ſecond and third ſtories. Some ſconces in Mr. Colquhoun's houſe were obſerved to vibrate during the ſhock: but nothing more happened worth notice. I am, &c.

As it may not be unacceptable to the Royal Society, or you, to be informed of the following fact, which I ſuppoſe you have not heard of, I was at ſome pains to enquire particularly into the truth of it; about which I think there can now be no doubt.

" By a letter now in my cuſtody, from a paſſenger on board the ſhip belonging to Mr. David Loch, merchant in Leith, and bound from Leith for Charles-town in South-Carolina, we are informed, that upon the night of the 23d or 24th of October laſt, when the weather was quite calm, a ſhower of duſt fell upon the decks, tops and ſails of the ſhip, ſo that next morning they were covered thick with it. The ſhip at this time was betwixt Shetland and Iceland, about 25 leagues diſtant from the former, and which was the neareſt land."

There were other letters came to this place, and to Leith, from paſſengers on board the ſame ſhip, confirming the truth of what I have related, and containing ſome of the duſt. This ſhower was probably

bly owing to the great eruption, which happened to the mountain Hecla in Iceland, in October. I am, &c.

Edinburgh, Feb. 10, 1756. Signed Robert Whytt.

LXVIII. *Extract of a Letter from Monſ.* Bonnet, *F.R.S. to Mr.* Trembley, *F.R.S. dated at* Geneva, 30 January 1756, *concerning the Earthquake on the* 14*th of* November, 1755, *in* Valais *in* Swiſſerland. *Tranſlated from the* French.

Read Feb. 19, 1756.

VALAIS is thought to have been more ſhaken by the earthquake than our city and its neighbourhood. I procured a letter to be written to Brigue for a particular account of it. The following is an extract of the anſwer of a merchant of that town, to whom the letter was addreſſed. I ſhould have been glad to have had ſome information concerning Brigue itſelf, which is ſaid to have ſuffered conſiderably; but you will find, that this merchant ſays not a word of it. I ſhall make a freſh inquiry.

Brigue, January 26, 1756.

THE earthquake felt here, happened on the 14th of November, at three in the afternoon. It proceeded from the North, and laſted a minute. The earth opened on the mountain; and the open-

ing was large enough to thruſt one's hand in, and no bottom can be found. In another part of the mountain the earthquake opened a ſpring ſufficient to turn two mills. It continues to run near the Rhone. It is remarkable, that before the earthquake there was no ſource of water in that place. The earth has been opened in another place. The opening is round, and no bottom can be diſcovered. The earth continues to ſhake almoſt every day, but theſe ſhocks are much gentler than the firſt. People here are under extreme apprehenſions. Moſt of the inhabitants are retired into the mountains, where they lodge in wooden houſes, which are ſafer than thoſe in the city.

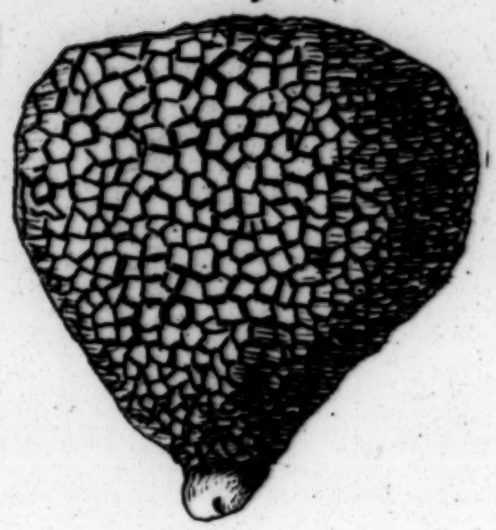
LXIX. *Extract of a Letter from Monſ.* Allemond, *Profeſſor of Natural Philoſophy at* Leyden, *and F. R. S. to Mr.* Trembley, *F. R. S. Tranſlated from the* French.

Leyden, Jan. 27, 1756.

Read Feb. 19, 1756.

ON the night between the 26th and 27th of the laſt month of December, 1755, between eleven o'clock and midnight, there was a conſiderable earthquake on the frontiers of this country. It was felt at Liege, Maeſtricht, Nimeguen, Arnheim, and, according to ſome accounts, at Breda. There were three different ſhocks, the laſt of which happened at about four in the morning,

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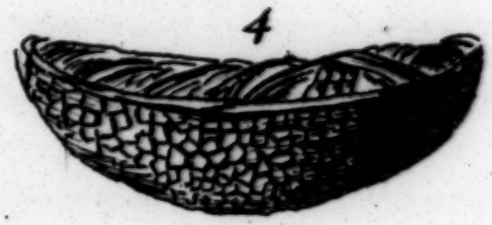
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12



10



B.XV. p. 513.

3



6



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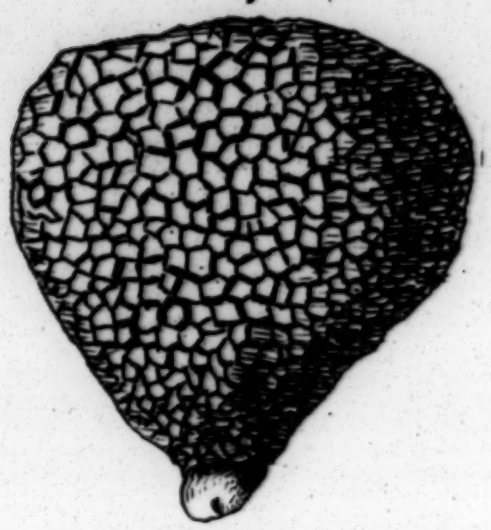


12



J. Mynde sc.

1



2



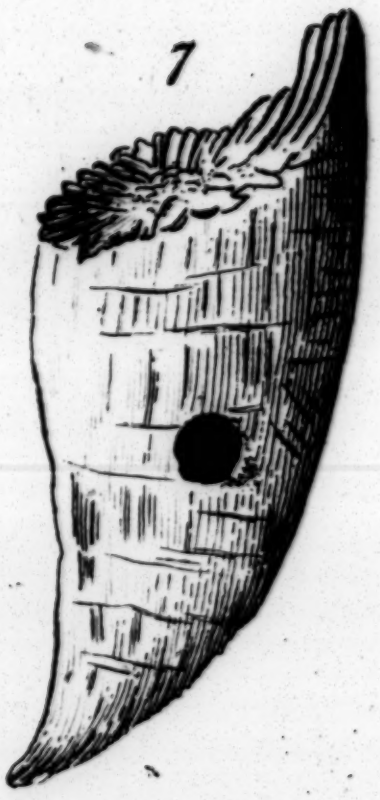
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11



10



but without any noiſe or accident. I have been informed by letters from Switzerland, that ſeveral ſhocks were felt there, and that the ſalt-ſprings of Bevieux have been rendered more ſalt.

At Amersfort, in the province of Utrecht, on the fifteenth of this month, was felt a ſhock of an earthquake, which occaſioned great conſternation, but no damage.

LXX. *An Account of ſome* Fungitæ *and other curious coralloid foſſil Bodies*; *by* Thomas Pennant, *Eſq*; *Communicated by Mr.* Henry Baker, *F. R. S.*

Read Feb. 19, 1756. FIG. I. (TAB. XV.) was found in the limeſtone quarries in Coalbrooke-Dale Shropſhire, the greateſt magazine of coralloid foſſils, that I am acquainted with.

The length of this elegant body is equal to that drawn, and its greateſt diameter (which is near the top) is about an inch and half. It is exactly of the form of a pear, with a ſmall portion of ſtalk remaining; and its whole ſurface is covered with ſmall ſhallow polygonal cells, the ſtalk excepted, which is perfectly ſmooth.

Fig. II. is a ſmall fungites from the ſame place, of the ſame ſize with the figure; the top is convex, and thick ſet with minute circular cavities; the ſtalk tends to a conoid form, and is coarſely ſtriated lengthways.

Fig.

Fig. III. has a very deep cup-like cavity in it, the bottom of which is very finely radiated; the remaining part covered with ſmall tubera, not unlike thoſe, that ſometimes are ſeen in the inſides of flints and pebbles.

Externally it is irregularly cellular, but the ſtalk is ſtriated.

Fig. IV. is a very ſingular body, and the moſt remarkably ſhaped fungites I ever ſaw, being exactly oval on one ſide, and flat the other, without the leaſt appearance of ſtalk. The oval or lower part is reticulated with polygonal cells, like Fig. I. The flat or upper part is ſtriated ſemicircularly, the ſtriæ paſſing from one ſide to the other, and then reverting.

Fig. V. This I received out of Italy, under the name of *lapis ſubluteus Veronenſis ſtellis majoribus.* The ſurface is finely marked with ſtar-like cells, which are elegantly ſtriated from their center; and their edges riſe a little prominent. The lower part of this ſtone is of a conoid ſhape, and irregularly indented with coarſe circular rugæ.

Fig. VI. was found at Coalbrooke-dale, is of a white colour, and very ſmooth both on the ſides and top, without any appearance of ſtriæ: but what renders this very ſingular, is the remarkable thinneſs, its greateſt diameter not exceeding the eighth of an inch.

Fig. VII. was found at the top of one of the higheſt mountains in this county, near Caer-gwrle, in a reddiſh loamy ſoil, together with various other diluvian remains.

It is of a conoid ſhape, but conſiderably incurvated; the ſides are ſtriated lengthways, and likewiſe circularly, but the circular ſtriæ are much leſs frequent than the others. At the thicker end there appears to have been a deep cup-like cavity, the greateſt part of which had by ſome accident been deſtroyed, but what remains is radiated with thin and very prominent ridges placed at equal diſtances from each other. On one ſide is a ſmall flat fungites.

Fig. VIII. is a fungites from Coalbrooke-Dale, ſeemingly formed of three or four ſmaller, inſerted one into the other. It has the ſame cavity on the top as the former, with a minute ſtriated concha anomia in it.

Fig. IX. This fungites is almoſt ſtrait, has a ſmall cup like ſtriated cavity on the upper end, is encompaſſed with prominent ridges on the ſides, and is ſtriated lengthways.

Fig. X. This ſpecies came from Piedmont, and differs from all the reſt. It may be called an echinated fungites, having ſix orders of ſharp-pointed ſtuds running lengthways from top to bottom, and between each order appear ſome very minute longitudinal ſtriæ. The upper part, inſtead of a cavity, is compoſed of ſeveral thin lamellæ riſing above the ſides.

Fig. XI. is a Coalbrooke-Dale production, and is a cluſter of fungitæ, tho' only two appear in the figure.

This varies from ſome of the foregoing in the ſhape of its head, in the middle of which is a ſhallow circular cavity, its ſides riſing a little prominent,

and

and the ſtriæ, which commence the inſide, paſs over the ridge, and are continued to the edges.

I am indebted to the ſame place for the XIIth Fig.

The cup-like cavity in this is pretty deep, and radiated with deep ſtrigæ: and the ſides are marked with very diſtinct ridges running lengthways, tho' ſometimes interrupted by circular furrows.

LXXI. *An Account of Inoculation by Sir* Hans Sloane, *Bart. given to Mr.* Ranby, *to be publiſhed,* Anno 1736. *Communicated by* Thomas Birch, *D. D. Secret. R. S.*

Read Feb. 19, 1756.

I Had heard by ſeveral reports from China and Guinea, but eſpecially from Turkey, of the inoculation (as it is called) of the ſmall-pox; and took an opportunity, when the late Dr. William Sherrard was conſul of the Engliſh Nation at Smyrna, to deſire the favour of him, it being an operation never practiſed in theſe parts, nor by ſome phyſicians thought practicable, to inform me of the truth and ſucceſs of it. In anſwer to which he told me, that the conſul from Venice reſiding there, a phyſician, Dr. Pylarini, had taken particular notice of that practice, and had promiſed to ſatisfy me about it; which he did by a letter, which was printed in the *Philoſoph. Tranſact.* in 1716, and I believe at Venice.

This notice lay aſleep till the hon. Mr. Wortely Montague, who being ambaſſador from England at the

the port, and the lady Maryhad inoculated their ſon at Conſtantinople, and wrote about this practice, and the advantages of it, to the court and their acquaintance here, and afterwards brought into England their inoculated ſon, in perfect health.

The princeſs Anne, now princeſs royal of Orange, falling ill of the ſmall-pox in ſuch a dangerous way that I very much feared her life, the late queen Caroline, when princeſs of Wales, to ſecure her other children, and for the common good, begged the lives of ſix condemned criminals, who had not had the ſmall-pox, in order to try the experiment of inoculation upon them. But Mr. Maitland, who had inoculated at Conſtantinople, declining for ſome reaſons to perform the operation, leſt it ſhould be loſt, I wrote to Dr. Terry at Endfield, who had practiſed phyſic in Turky, to know his opinion and obſervations about it; who returned me this anſwer, that he had ſeen the practice there by the Greeks encouraged by their patriarchs; and that not one in eight hundred had died of that operation. Upon my ſpeaking to Mr. Maitland, he undertook the operation, which ſucceeded in all but one, who had the matter of the ſmall-pox put up her noſe, which produced no diſtemper, but gave great uneaſineſs to the poor woman. After their recovery, in order to obviate the objection made by the enemies of this practice, that the diſtemper produced by it was only the chicken-pox, ſwine-pox, or *petite verole volagere*, which did not ſecure perſons againſt having the true ſmall-pox, Dr. Steigertahl, phyſician to the late king, and I, joined our purſes to pay one of thoſe, who had it by inoculation in Newgate, who was ſent to Hertford,

where the diſeaſe in the natural way was epidemical and very mortal, and where this perſon nurſed and lay in bed with one, who had it, without receiving any new infection.

To make a further tryal, the late queen Caroline procured half a dozen of the charity-children belonging to St. James's pariſh, who were inoculated, and all of them, except one (who had had the ſmall-pox before, tho' ſhe pretended not, for the ſake of the reward) went thro' it with the ſymptoms of a favourable kind of that diſtemper.

Upon theſe tryals, and ſeveral other in private families, the late queen, then princeſs of Wales, (who with the king always took moſt extraordinary, exemplary, prudent and wiſe care of the health and education of their children) ſent for me to aſk my opinion of the inoculation of the princeſſes. I told her royal highneſs, that by what appeared in the ſeveral eſſays, it ſeemed to be a method to ſecure people from the great dangers attending that diſtemper in the natural way. That the preparations by diet, and neceſſary precautions taken, made that practice very deſirable; but that not being certain of the conſequences, which might happen, I would not perſuade nor adviſe the making trials upon patients of ſuch importance to the public. The princeſs then aſked me, if I would diſſuade her from it: to which I made anſwer, that I would not, in a matter ſo likely to be of ſuch advantage. Her reply was, that ſhe was then reſolved it ſhould be done, and ordered me to go to the late king George the firſt, who had commanded me to wait on him upon that occaſion. I told his majeſty my opinion, that it was impoſſible

to

to be certain but that raiſing ſuch a commotion in the blood, there might happen dangerous accidents not foreſeen: To which he replied, that ſuch might and had happened to perſons, who had loſt their lives by bleeding in a pleuriſy, and taking phyſic in any diſtemper, let never ſo much care be taken. I told his majeſty I thought this to be the ſame caſe, and the matter was concluded upon, and ſucceeded as uſual, without any danger during the operation, or the leaſt ill ſymptom or diſorder ſince.

I have been conſulted with upon the like occaſion by many, and have been of opinion, that ſince it is reckoned, that ſcarce one in a thouſand miſſes having it ſome time in their life, the ſooner it is given them the better, notwithſtanding the heat of ſummer, or cold of winter; the danger being greater from falling into the diſtemper naturally, than from the heat or cold of either.

What I have obſerved, which I think material, is not to inoculate ſuch, as have any breakings out on their faces, ſoon after the meaſles, or any other occaſion, whereby the ſmall-pox were likely to be invited, and come in the face in greater number, and ſo make the diſtemper more dangerous. Bleeding in plethora's, or gentle clearing of the ſtomach and inteſtines, are neceſſary; and abſtinence from any thing heating, about a week before: and nothing elſe needful by way of preparation; and very little phyſic during the courſe of it, unleſs accidents happen.

The operation is performed by making a very ſlight ſhallow inciſion in the ſkin of the arms about an inch long; but great care ſhould be had in making the

inciſion, not to go thro' the ſkin; for in that caſe I have ſeen it attended with very troubleſome conſequences afterwards. After the inciſions are made, a doſſil dipped in the ripe matter of a favourable kind of ſmall-pox, produced naturally, or by inoculation, is put into the wound, covered by a diapalma plaiſter for twenty-four hours, and then removed, &c. I have known in ſcarcity of good matter in London, that it has been brought from Seven-oaks in Kent, and applied with good ſucceſs.

Of above two hundred, that I have adviſed before the operation, and looked after during it and its conſequences, but one has miſcarried, a ſon of the duke of Bridgewater, (in whoſe family this diſtemper had been fatal) where the eruption of the ſmall-pox was deſperate, notwithſtanding it was perfectly ſafe in his ſiſter, who had undergone the ſame preparations, and was inoculated the ſame day, and with the ſame matter uſed for her brother.

Upon the whole it is wonderful, that this operation, which ſeems ſo plainly for the public good, ſhould, through dread of other diſtempers being inculcated with it, and other unreaſonable prejudices, be ſtopped from procuring it.

One thing I have obſerved, that though the perſons inoculated were advanced in years, it was equally ſucceſsful as in younger perſons.

LXXII.

LXXII. *Extract of a Letter from Dr.* John Stevenſon, *Phyſician at* Edinburgh, *to* John Pringle, *M. D. F. R. S. dated* Edinburgh, 17 Feb. 1756, *with an Account of an extraordinary Agitation of the Water in a ſmall Lake at* Cloſeburn, *in the Shire of* Dumfries; *by Sir* Thomas Kilpatrick, *of* Cloſeburn, *Bart.*

Read Feb. 26, 1756.

THE incloſed is from Sir Thomas Kilpatrick, a gentleman of undoubted good ſenſe and veracity. The lake I have ſeen long ago, but cannot be preciſe as to its dimenſions, which I gueſs may be a quarter of a mile long. The phænomenon happened on the firſt of this month February, which was here the fineſt, clear, calm day we have had this winter. Till now I doubted of the accounts you believed, of agitations in ponds; now I do not, for not only this ſmall lake, but ſome ponds near, it were moved.

By a letter ſome days after, there is mention made of two returns of theſe commotions ſince the former, but in a moderate degree in compariſon with the others.

Sir

Sir Thomas Kilpatrick's *Letter.*

Cloſeburne, 4 Feb. 1756.

ABout a quarter before nine on Sunday morning, we were alarmed with an unuſual motion in the waters of Cloſeburn-loch. The firſt thing, that appeared to me in this wonderful ſcene, was a ſtrong convulſion and agitation of the waters from the weſt ſide of the loch towards the middle, where they toſſed and wheeled about in a ſtrange manner. From thence proceeded two large currents formed like rivers, which run with ſwiftneſs and rapidity beyond all deſcription, quite contrary ways, one from the middle to the ſouth-eaſt, and the other to the north-eaſt points of the loch. There they were ſtopt ſhort, as the banks are pretty high, and obliged to turn, which occaſioned a prodigious tumbling and agitation at both ends of this body of water. There was likewiſe a current, which roſe ſometimes conſiderably above the ſurface near the weſt ſide, that I frequently obſerved running with great velocity an hundred yards to the ſouthward, and returning in a moment with as great velocity the other way. What I noticed in the next place, was the toſſing of the waters in the ponds, which were more or leſs moved as the agitations of the loch came nearer this ſide, or kept a greater diſtance from it. But as it is beyond my capacity to give a particular deſcription of all that happened upon this occaſion, I ſhall conclude with telling you, that the agitations and currents above-mentioned continued, without intermiſſion, for at leaſt three hours and an half, or four hours, when they

they began to abate a little in their violence, though they were not quite over at ſun-ſet. I had almoſt forgot to tell you, that this ſtrange phænomenon was renewed on Monday morning a little before nine, and laſted for an hour and an half; but the motion of the water was not near ſo violent as the day before. What is very remarkable, there was not the leaſt breath or gale of wind on Sunday till one o'clock: a circumſtance, which helped us not a little in our obſervations.

LXXIII. *Accounts of the Irregularities of the Tides at* Chatham, Sheerneſs, Woolwich *and* Deptford, *in* Feb. 1756. *Communicated by the Rt. Hon.* George *Lord* Anſon, *F. R. S.*

LETTER I.

SIR,

Read Feb. 26, 1756. THIS acknowledges the receipt of your letter of the 21ſt inſtant; in return to which I have ſent you, for my lord Anſon's information, an account of the irregularity of the tides, having taken particular notice of them by the Lys, a French ſhip, having broke from her moorings three times in that week. The firſt time was on Thurſday the twelfth inſtant, at about ten in the morning, it being then about high water, or rather ebb; ſo that we could not get her off that tide, but attended and hove her off the next, at about nine at night, which was ſooner than we expected

pected by an hour and half. We then put her to another mooring, and about half paſt eleven the ſame night, ſhe broke from them alſo, and came on ſhore near the dock, it being then a ſmall matter ebb, ſo that we could not get her off that tide, but attended her the next, till half paſt eleven on Friday morning in order to do it, (it then being about the time of high water) but could not, the tide being not ſo high by five or ſix feet as it was the tide before, though it ſhould have been higher, as they were encreaſing. And I further took notice at the ſame time, that the tide was at a ſtand ſeveral minutes, and then flowed again near a foot in height before it ebb'd, and the next tide, at half paſt nine at night, we got the ſhip off, though we did not expect ſhe would have floated till near twelve: and again in tranſporting her up to her moorings, we obſerved, that there was little or no tide ran from ten to twelve, which was about the time of high water; which we greatly wondered at, as it was quite calm. All which irregularities I imagine to be owing to the wind, having had very hard gales for moſt part of that week; but ſince have obſerved nothing in them particular. Pray my humble duty to his lordſhip. I am with my beſt reſpects,

S I R,

Chatham-yard, Feb. 23, 1756.

Your moſt obedient

humble ſervant,

Michael Godden.

To Philip Stephens, Eſq;

LETTER

LETTER. II.

SIR,

Read Feb. 26, 1756. IN obedience to my lord Anſon's commands communicated to me by your letter of the twenty-firſt, I herewith tranſmit you the beſt accounts I could collect, together with my own obſervations on the tides at this place from the ninth to the nineteenth inſtant, and beg leave to obſerve to you, that the day tide on the thirteenth inſtant was very remarkable; for it ebb'd no more than two feet and a half for four hours after high water, when it was obſerved to flow again for a few minutes; then ebb'd again, but ſo little, that at low water, we had ſeven feet water at the ſtern of the dock, which is five feet more than was ever known to be. It blew very hard in the morning on the flood, with the wind to the ſouthward of the weſt, and on the ebb in the afternoon the wind abated and veered to the north-weſt, to which I then, in part, attributed this phænomenon, as a northerly wind forces water into this river, and always makes high tides, and a ſoutherly wind the contrary.

Sheerneſs, Feb. 23, 1756.

Your moſt obedient and
moſt humble ſervant,
Michael Monarty.

To Philip Stephens, Eſq;

Year, Month and Day.	*Time of High-Water.*	*Depth of Water.*	*Wind.*
1756,		Feet. Inches.	
Feb. 9,	¼ paſt 6 in the morn.	12, 8.	S. by W.
Ditto.	¾ paſt 6 at night.	9, 10.	S.S.W.
10th,	½ paſt 7 in the morn.	13, 6.	Calm.
11th,	¼ paſt 9 at night.	13, 6.	S.W.
12th,	10 at night.	15, 5.	W.S.W.
13th,	¾ paſt 10 in the morn.	11, 0.	Ditto.
Ditto.	¼ paſt 11 at night.	15, 11.	W.N.W.
14th,	½ paſt 11 in the morn.	12, 6.	W.S.W.
Ditto.	12 at night.	15, 0.	W.
15th,	5 min. paſt 12 in the morn.	17, 0.	W. by N.
16th,	¼ paſt 12 in the morn.	11, 8.	S.W.
Ditto.	¾ paſt 12 P. M.	18, 0.	W.N.W.
17th,	½ paſt 1 in the morn.	16, 0.	Ditto.
18th,	¼ paſt 1 in the morn.	17, 0.	E.S.E.
19th,	¾ paſt 2 in the morn.	17. 6.	N.W.

LETTER III.

SIR, Woolwich Yard, 25 Feb, 1756.

Read Feb. 26, 1756. I Am favoured with yours of the 21ſt inſtant, ſignifying my lord Anſon's commands, to ſend you ſuch obſervations, as I have made myſelf, or the beſt accounts I may be able to collect from others, of the tides for the laſt week, and even for ſome days this week, being very irregular and unuſual. And in obedience to your ſaid letter, I have collected the beſt accounts I can, and with ſome obſervations I made myſelf, have ſent them

them incloſed for his lordſhip's information: and am, with due reſpects,

SIR,

Your moſt obedient ſervant,

Walter Taylor.

To Philip Stephens, Eſq;

1756 Feb. Woolwich-Yard, 25 Feb. 1756.

Monday 9, wind S. freſh gale and cloudy, tides very irregular.

Tueſday 10, S.W. freſh breeze with rain, ditto

Wedneſday 11. S.W. freſh breeze and froſty, ditto.

Thurſday 12, S.W. blue hard and cloudy; the night tide flowed about two feet ten inches higher than the morning tide.

Friday 13. W.N.W. blew hard and cloudy; the night tide flowed about three feet higher than the morning-tide.

Saturday 14, S.W. freſh gale and cloudy; tides more regular.

Sunday 15, W. freſh breeze and cloudy, ditto.

Monday 16, As it drew near the time for launching his majeſty's ſhip Royal-George at this yard, I took more notice, and obſerved, that this day we had the wind at W. and W. by N. a ſtrong gale, and the ebb-tide drained well out. On the flood, we had a good ſpring-tide.

Tueſday 17, The wind flew to W.S.W. a ſtrong gale, which drained the ebb-tide more conſide-

rably out than yeſterday; and on the flood we had a good ſpring-tide, much the ſame water as yeſterday.

Wedneſday 18. About two o'clock this morning, the wind was at E. a freſh breeze and hazy; (but I believe in the northern ſeas it might then blow a ſtrong gale at N). As the day came on the gale encreaſed, and blew hard at N.E. with ſnow. The flood this day I obſerved came in much ſooner than uſual, and ſeemed to flow gradually at firſt, but between one and two p. m. the tide flowed ſeveral feet, as on a ſudden, and continued flowing till three quarters paſt three, being ſome time longer than it was expected it would, and we had a high tide.

Thurſday 19. The wind was W.N.W. a freſh gale and froſt. And this day's flood did not hold ſo long by a quarter of an hour as yeſterday's, and not ſo much water by ſeveral feet. The wind being to the weſtward, and a froſt, greatly check'd the tide.

Since which, the tides have been very regular.

Walter Taylor.

LET-

LETTER IV.

Deptford-yard, 24 Feb. 1756.

An Account of the Moon's Age, Time of High-Water at the Double-Dock-Gates, Obſervations of the Wind and Weather.

Read 26 Feb. 1756.

Day of the Month.	Moon's Age.	Time of High Water.	Height of Water at the Double-Dock-Gates.	Wind.	Obſervations of the Weather.
1756	Days.	Hrs. Mi.	Feet Inches.		
Feb. 2	12	10 3	14 6	W.	Cloudy with hard gales.
13	13	11 0	14 0	S.W.	Fair.
14	14	12 0	15 6	S.W.	Ditto.
15	15 Full	1 0	13 0	S.W	Cloudy with rain.
16	16	2 0	15 6	W.byN.	Freſh gales.
17	17	3 0	16 0	N.E.	Ditto.
18	18	3 20	16 6	N.E.	Cloudy.
19	19	4 0	15 3	N.E.	Fair.
20	20	4 30	15 6	S.W.	Ditto.
21	21	5 0	14 8	S.W.	Ditto.
22	22	6 15	14 4	S.W.	Ditto.
23	23	7 30	14 2	N.W.	Little wind, foggy

LXXIV. *Accounts of the Irregularities of the Tides in the River* Thames, *on the* 12*th and* 13*th of* February, 1756. *Communicated by* Robert Dingley, *Esq*; *F. R. S.*

SIR,

Read Mar. 4, 1756.

ACcording to your desire, I shall set down in writing the variations, that happened in the tides the 12th and 13th of last month, according to my own observation, and from others of whom I enquired; *viz.*

Thursday Feb. 12, the time of high-water at London-bridge that day was about half after eleven, and flowed no higher at Westminster-bridge at high-water than the low-water is, at times when extraordinary land floods are out, and the wind to the Northward. The wind during the whole flood was at W.S.W. and blew hard.

On the 13th it was high-water at London-bridge rather before one o' clock, and continued ebbing till four, when the water was gone from the Custom-house wharfs, where I was with a merchant's clerk, consulting how to get some goods aboard my craft, in order to send them down to the ship, my servant having neglected to put my boat under the crane before the water had left the wharf. During this parley, the water most unexpectedly flowed again directly; and without that extra phænomenon setting my boats afloat, it would have been impossible to have shipped the goods that day, being seven large bales and twenty thousand ounces of silver.

During

During the time of the water flowing, the ſtrength of the current going down was greatly abated, almoſt to a ſlack; the water below the ſterlings was almoſt on a level with that above; by which I conjecture, that the water flowed near three feet perpendicular. My boat of nine tuns burden being loaded, and drawing near two feet water, being put off into the ſtream, I went down to the Hermitage, where another of my ſervants was loading a lighter of hemp, and obſerved as I went along, that the water began to ebb from the ſhore. Having ſtayed there about half an hour, to give the neceſſary directions to my ſervants, I went to take a walk; for which I am extremely ſorry, as I miſſed obſerving with due attention this extraordinary variation. All my ſervants agree, that by their obſervations, though not over exact, when the water had only ebbed about two feet, it flowed again to the ſame height as before.

One John Hare, a waterman, told me, that as he was going in his boat to Woolwich, to his great ſurpriſe he met the flood in Greenwich-reach, and afterwards to Bugby's-hole, and got to Woolwich a conſiderable time before low water; which intirely agrees with what my ſervants and other watermen who were at work remarked, that it flowed twice in the time of ebb, as it ought to have done, had it been regular; and had it been regular, it would have ebb'd till near nine that evening; inſtead of which the real flood came about a quarter before ſeven, and continued flowing till one after midnight, without any apparent current, till twelve, which prevented my ſervants, and partner with them, bring-

ing

ing the craft upwards to their deſtined places, and as ſoon as the tide pinched, the ebb came down at once.

I apprehend, that as the floods were remarkably weak for ſeveral days, and the water of a yellow colour, great rains had fallen in the Weſt-country, tho' we had none here ſufficient to produce ſuch effects. And what is more extraordinary to me, is, why the highwater ſhould be ſo remarkably low, if there had been land floods, eſpecially on the 13th and 14th, when the wind was from W.N.W. to N.W. which generally brings in the flood ſooner, and makes it flow higher; tho' it partly accounts for the evening tide. On the 13th no obſervation was or could be made above London-bridge on the 13th, by reaſon the water never flowed to a level with the water above. I am,

SIR,

Your moſt obedient ſervant

Copy of a Letter on the ſame ſubject, from Captain William Mitchel. *Dated* Hermitage *Five o'clock*, 12 Feb. 1756.

SIR,

THE difference between the laſt tide and a common neap tide was four feet; and betwixt it and the common ſtream about nine feet perpendicular; betwixt it and a very high tide in laſt November, above ten feet. The carpenters and labourers in the dock-yard, from whom I had this

in

intelligence, ſay, they never knew, in forty to forty-five years obſervation ſo low a tide, by full two feet; you may depend on the winds having been ſtronger to the S.W. below than here.

William Mitchell.

To the Rt. Hon. George, *Earl of* Macclesfield, *Preſident of the Royal Society.*

My Lord,

Read Mar. 11, 1756. IN obedience to your lordſhip's commands, I have informed myſelf more particularly what Hare the waterman related, concerning the late irregularity of the tide, in the paper I had the honour to lay before the Society laſt Thurſday, which is as follows.

That Hare going down the river the 13th paſt with the current, he met an unexpected ſlack in Greenwich-reach. Soon after, as he proceeded, the current regained its force; but about three miles lower, in a reach called Bugby's-hole, he met again another ſlow or ſlack water; and before he got to Woolwich, which is about three miles lower, the current regained its force, and continued running down ſome time after; whereas, according to the tides, had they been regular, it ought to have been low water before the time he got to Woolwich.

By enquiring more circumſtantially relating to this phænomenon, that as the wind then prevailed pretty ſtrong at W.N.W. and N.W. in all probability the wind might make a ſudden ſhift, which cauſed theſe ſudden impulſes or eddies: but this I ſubmit to your

lordſhip's ſuperior judgment, being with all poſſible reſpect,

My Lord,

Your Lordſhip's moſt obedient

humble ſervant,

London, Mar. 8, 1756.

Robert Dingley.

LXXV. *Thoughts on the Reverend Dr.* Hales's *new Method of Diſtillation by the united Force of Air and Fire. By* William Brownrigg, *M. D. F. R. S.*

To the Rev. Dr. Hales, *D. D. F. R. S.*

Dear Sir, Whitehaven, Dec. 3, 1755.

Read Feb. 26, 1756.

I Duely received the favour of your letter, written ſo long ago as the latter end of May laſt; containing an account of your important diſcovery of raiſing large quantities of water by the united operation of air and fire, in your new method of diſtillation. In obedience to your commands, on the receipt of your letter, I immediately ſet about conſidering to what uſes your ingenious invention might be applied, beſides the great one of ſupplying navigators with freſh water; and ſhortly after wrote out the incloſed paper relating to the improvement

provement of the fire-engine.* This I preſented, with your letter, to my worthy friend and relation, Mr. Carliſle Spedding, then ſuperintendent of our coal-mines, who was an excellent mechanic, and had then the charge of five fire-engines, ſeveral of which had been under his care and management from the time, that thoſe machines were firſt brought into uſe, and had himſelf made conſiderable improvements in them. He was pleaſed to expreſs his approbation of what I had written, and was of opinion, that future improvements of the fire-engine muſt depend chiefly on the right ſolution of thoſe two propoſitions, viz. "To increaſe the quantity of ſteam from a given "veſſel and a given heat, by means of mechanical "agitation; and, to augment the elaſtic force of a "given quantity of ſteam by means of fire:" and wiſhed, that proper experiments could be made in theſe matters, which he thought would prove too expenſive for moſt private people. His untimely and much lamented death put an end to theſe enquiries; and a variety of neceſſary avocations prevented me from ſooner communicating to you the reſult of them. They are chiefly conjectures, which experience muſt ripen into uſe. I dare not aſſert, that the theory is altogether faultleſs; therefore very unfit to appear before the public. The honour you did me of communicating my rough plan of a hiſtory of damps to the Royal Society, I eſteem a particular marks of your kindneſs and affection; altho' that plan was only intended for your own private uſe, and would not have appeared before that reſpectable body, (eſpecially in its preſent form) had it not

* Beaumont

been for your partial regard to it. I ſhould be ſorry to ſee any part of it publiſhed in the *Tranſactions*, eſpecially as I long ago laid aſide the deſign, which from the anſwer I received to the letter, of which I ſent you a copy, I did not then think myſelf at liberty to proſecute, and do not think, that I ſhall again find leiſure to reſume it. I have long been of opinion, that, in order to attain a perfect knowledge of the nature of the air, we muſt trace it from its hidden ſources in the bowels of the earth; and muſt own myſelf ambitious of treading in your ſteps, and of proſecuting your enquiries concerning the nature of its vivifying ſpirit;

Non ita certandi cupidus, quam propter amorem,
Quod te imitari aveo.

With this view, I had collected, under proper heads, all that I found in authors relating to that ſubject; and had prepared an apparatus, and alſo made ſome experiments to diſcover what alterations were produced in various kinds of air by ſtagnation; and what effects the different kinds of air, as well ſimple as compounded, had on animals included in them; and by theſe and ſuch-like experiments, I might perhaps entertain too ſanguine hopes of making ſome uſeful diſcoveries concerning the nature, and even the component ingredients, of the vivifying aerial ſpirit.

An ingenious friend, on reading the account of your method of diſtillation, was pleaſed to ſuggeſt, that the quantity of ſteam might perhaps be increaſed by heating the air, that is forced through the water contained in the ſtill. This might be done conveniently enough, by paſſing an iron pipe, that goes

from

rom the ventilator through the furnace, which boils the water in the body of the ſtill.

Dear Sir,

Your moſt affectionate and

moſt obedient ſervant,

W. Brownrigg.

Thoughts on the Rev Dr. Hales's *new Method of Diſtillation by the united Force of Air and Fire.*

Read Feb. 26, 1756.

IN the proceſs of diſtilling ſea water, as deſcribed by the reverend Dr. Hales, the great increaſe of vapour raiſed by his method, above what is raiſed by the common method of diſtillation, may be attributed, chiefly, to the violent agitation of the water contained in the body of the ſtill, by the motion of the air continually preſſed through it. Although the air, by attracting the watry particles, may alſo contribute to produce this effect. It is however certain, that a ſimple mechanical agitation of warm water will greatly promote its evaporation, by increaſing its ſurface, from whence the vapours ariſe, and by putting its heated particles in a briſker motion, and exciting between them actions and reactions, and ſo diſpoſing them to fly off in elaſtic vapours.

Of this we have inſtances in warm water, when ſtirred about in veſſels, or poured out of one veſſel into another; from which the vapours viſibly ariſe

in

in larger quantities than from the ſame water, when it is not moved by ſuch mechanical agitation.

This excellent invention of Dr. Hales may probably be applied to other purpoſes beſides that, which he had principally in view, viz. the diſtilling of ſea-water with greater eaſe and expedition, with leſs fuel, and in ſmaller veſſels, than has hitherto been practiſed, for the benefit of navigators.

It might be of ſingular uſe, if it could be applied in the fire-engine. The great expence of large boilers in the conſtruction of that machine, and the vaſt conſumption of fuel in the working of it, render its uſes much leſs extenſive than they would be, could thoſe expences be contracted. Various contrivances have with this view been tried; and it is to be wiſhed, that others could be diſcovered, that would more effectually anſwer the end propoſed.

But air cannot be applied, in this engine, to increaſe the quantity of the elaſtic ſteam, ſince it would paſs with the ſteam from the boiler into the cylinder, and prevent a vacuum from being there produced, and hinder the piſton from moving therein.

A mechanical agitation of the water in the boiler of the fire-engine may however be produced by other means, ſo as that a larger quantity of ſteam may probably be raiſed than can be effected in engines as commonly now conſtructed; by which means the expences of conſtructing and working thoſe uſeful machines may perhaps be greatly leſſened.

If, for example, the boiling water, inſtead of being agitated by air, as in Dr. Hales's method, was briſkly ſtirred about by a wheel placed in the boiler of the fire-engine; it is probable, that by this means

the

Fig. 1.

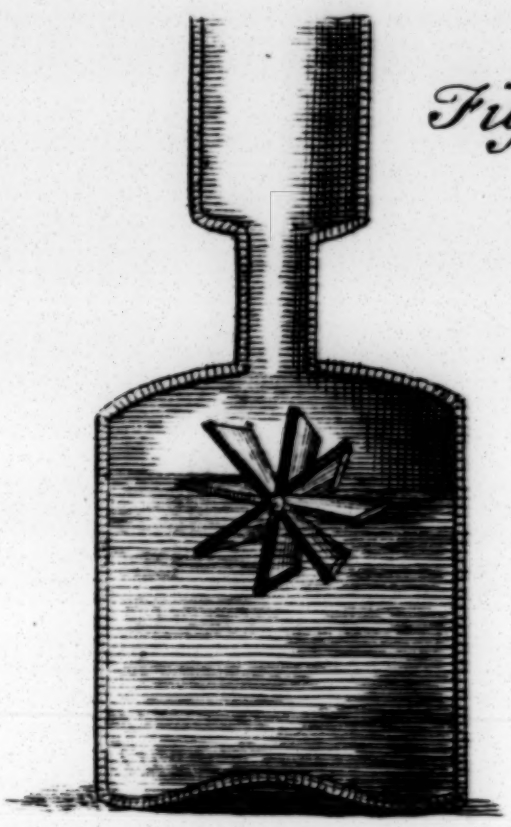


Fig. 2.

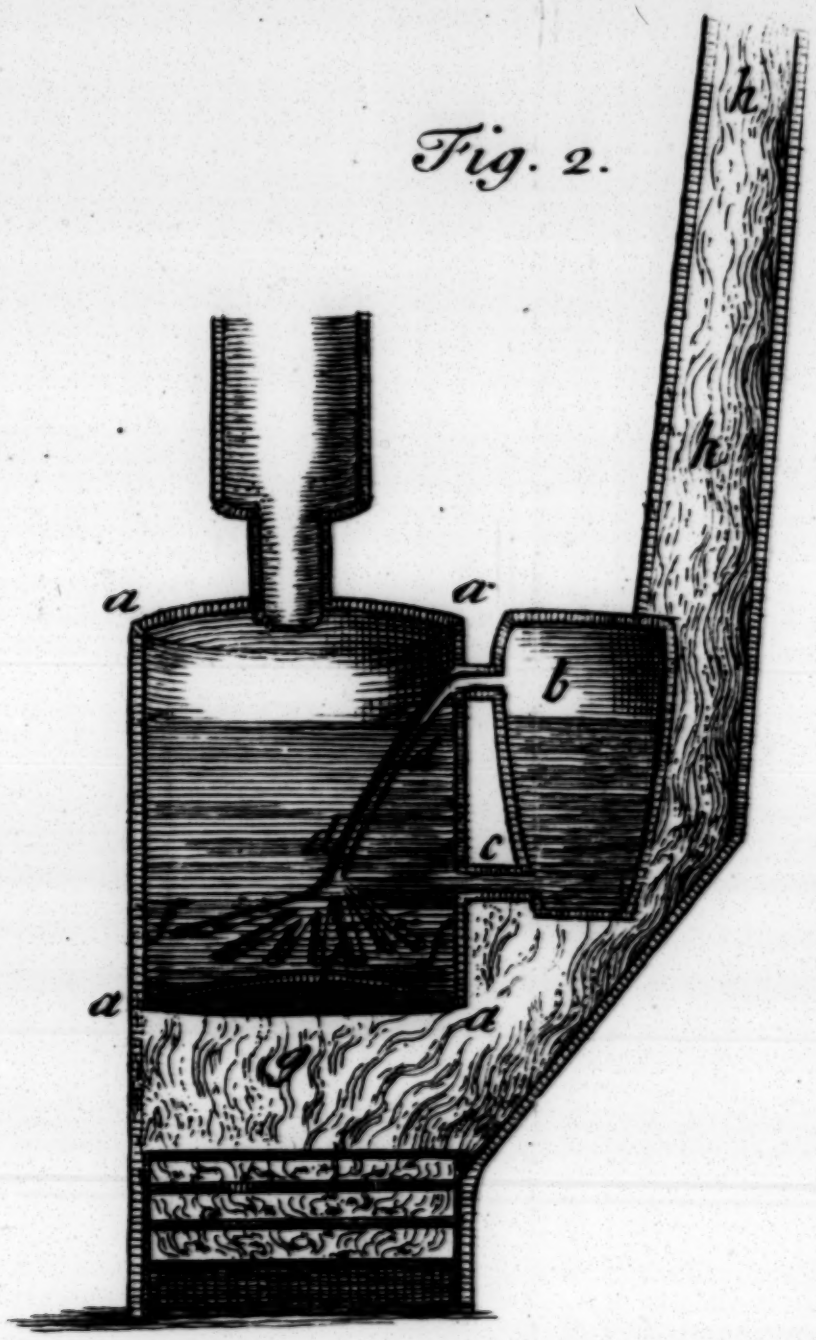


Fig. 3.

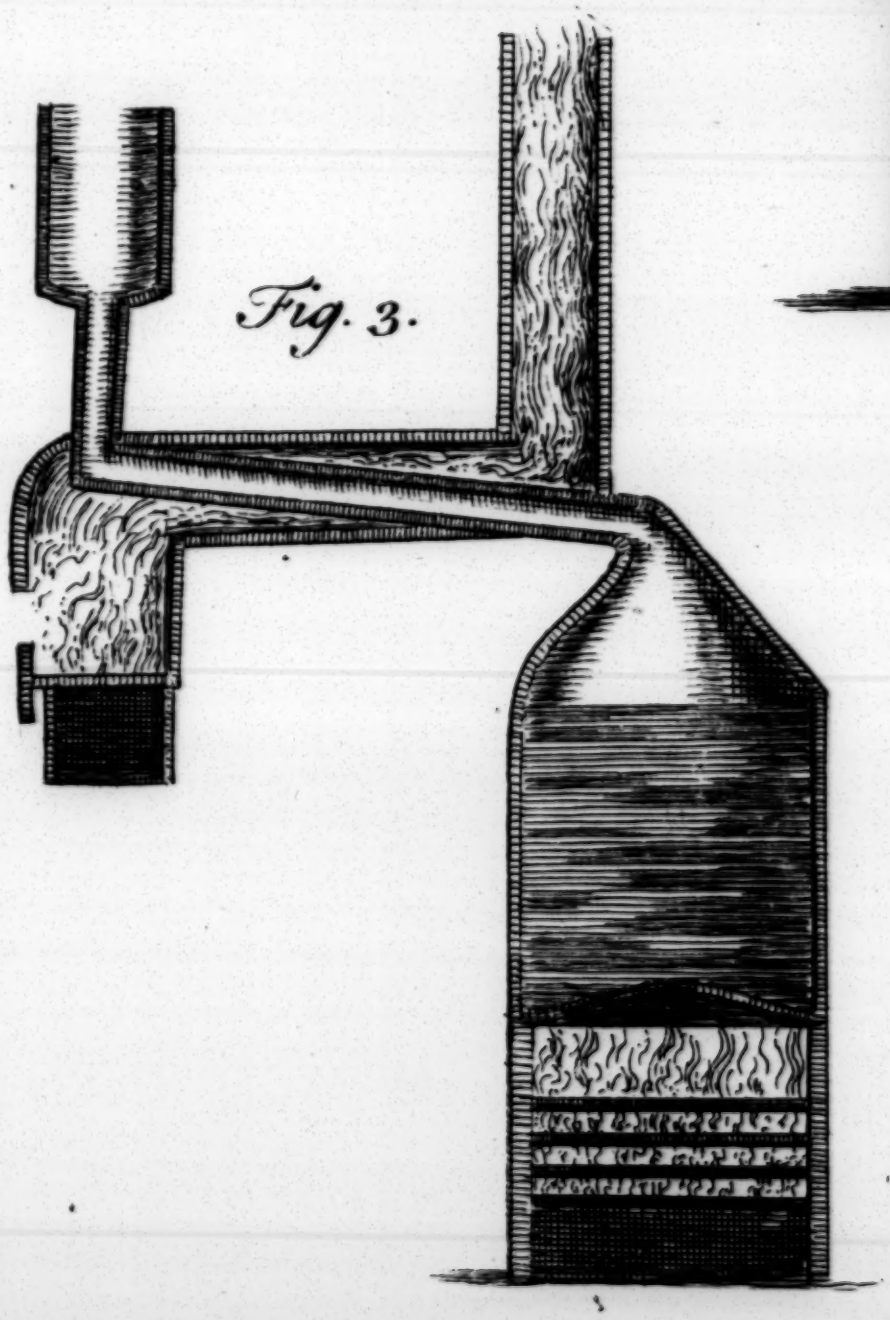


Fig.



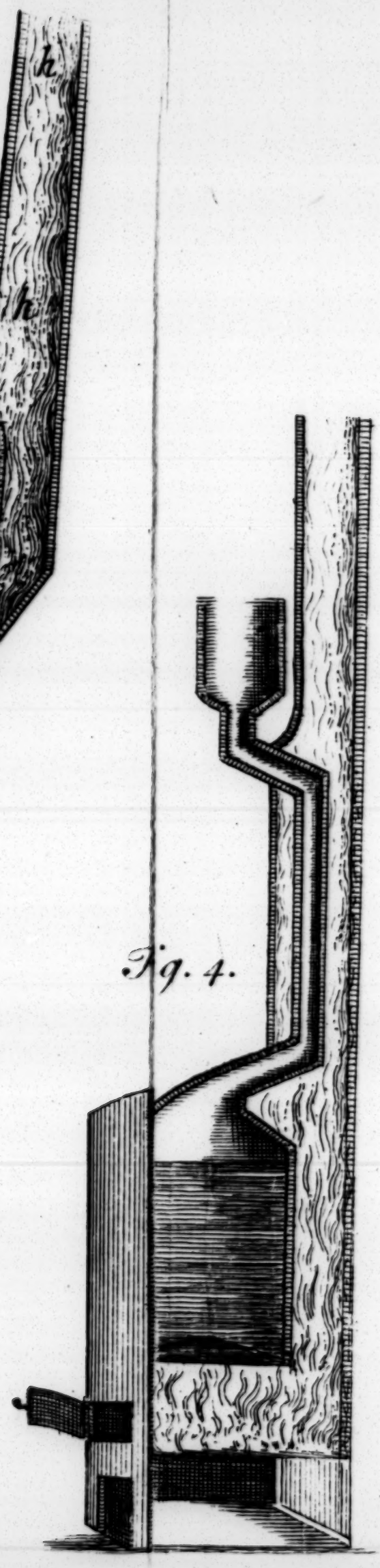


Fig. 4.

J. Mynde Sc.

the quantity of elaſtic vapour raiſed might be conſiderably encreaſed, and leſs fuel and a leſs boiler might then ſerve the purpoſe. The wheel might be turned round by the water drawn up by the engine; or might receive its motion from the beam of the engine by means of a crank; or a labourer might be employed in turning it round with the hand. See TAB. XVI. Fig. 1.

But the deſired effect might, in all probability, be better produced by means of elaſtic ſteam driven briſkly through the boiling water. The ſteam of water, as an elaſtic fluid, poſſeſſes many of the properties of common air.

Like air, when driven briſkly from the æolipile, it is obſerved to blow up fire; and when forcibly driven through water, will doubtleſs produce the the ſame agitation therein, as is done by common air in Dr. Hales's experiment; and may probably have the like effect with air, in elevating a larger quantity of elaſtic vapours.

In order to excite an agitation in the boiling water of a fire-engine, by means of elaſtic ſteam, the following ſimple and eaſy method may be tried.

Fig. II.

aaaa. The boiler of the fire-engine.

b. An æolipile, or ſmaller boiler, annexed to the larger, receiving boiling water from it by the pipe (*c*), and continually emptying ſtrongly elaſtic ſteam into it, by the alembic and tube (*dd*); which tube towards the bottom of the boiler is divided into many ſmaller tubes (*fff*)

per-

perforated with holes, thro' which the ſteam paſſing produces a violent agitation in the water contained in the large boiler, and ſo increaſes the quantity of elaſtic ſteam.

The flame of the fire (*g*) aſcending up the chimney (*hh*) may in its paſſage heat the water in the æolipole (*b*).

N.B. Either, or both, of the above contrivances may be applied to the boiler of an alembic, in the diſtillation of ſea water for the uſe of navigators, in imitation of the method invented by the rev. Dr. Hales.

Further Experiments relating to the Fire engine, by leſſening the expences of conſtructing and working it.

Theory.

It is found by experiments, that, *cæt. paribus*, the elaſticity, or expanſive force of common air, is in proportion to its denſity. And alſo that *cæt. par.* its elaſticity is proportional to its degree of heat. And therefore, that its elaſticity is proportional to its degree of heat,

The ſame probably holds true in other elaſtic fluids; and particularly in the ſteam of water; ſince, like all other bodies, it is capable of rarefaction (at leaſt to a certain degree) by heat; and its elaſticity, or expanſive force muſt augment in proportion to the degree of heat which it receives.

Ex-

Explanatory Example.

Let us ſuppoſe, for example, that the heat of the ſteam in the boiler of a fire-engine is now 300 degrees of Fahrenheit's thermometer; it is evident, that if the ſame ſteam could, by any art, be heated to 600 degrees, its expanſive force would be greatly increaſed; ſo that a much ſmaller quantity of ſteam thus heated would overcome the preſſure of the air, and elevate the piſton of the fire-engine, than is now applied for that purpoſe. And this ſmaller quantity of ſteam might be raiſed in ſmaller veſſels, and with leſs fuel than is now uſed in the working that engine.

Practical Obſervrtions.

The heat of the ſteam now applied muſt be nearly the ſame with the heat of the water, from which it is raiſed. The heat of boiling water, in open veſſels, is found, at a medium, about 212 degrees in Fahrenheit's thermometer; in cloſe veſſels, it is often conſiderably greater; but, in the boiler of the fire engine, can ſcarce exceed 300 degrees; it is certain, that it never approaches near to the heat of melted lead, ſince the ſides of the boilers are often made of that metal. And it is obſerved, that the fire, when it touches the ſides of the leaden boiler, where it is only filled with ſteam, does not melt the lead; the ſteam having the ſame effect with water in keeping the lead cool, to which the fire is applied.

From the following inſtance it nevertheleſs ſeems probable, that the ſteam of water may be brought to ſo great a heat, as to melt lead, to which it is applied. The pipe, which ſupplied the boiler of a fire-

engine with water, was by ſome accident ſtopped; and the water in the boiler was ſo exhauſted, that the crown of the boiler, (or the middle part of the iron bottom, which is moſt elevated) became quite dry, and was heated red hot. And altho' there was only ſo ſmall a quantity of water remaining in the boiler, the engine ceaſed not to work; but, on the contrary, was obſerved to move with unuſual briſkneſs; until at length, the ſtrongly heated, and extremely rarified ſteam melted the pewter, wherewith the joints of the top of the boiler (which was of copper) were ſoldered, and burſt through them with great impetuoſity.

Concluſion from the foregoing Experiments and Obſervations.

The foregoing experiments ſeem to prove, that the ſteam of water is capable of being heated and rarified to a much greater degree than the ſteam is heated, which is now applied in the fire-engine; and that the expanſive force of ſteam is greatly increaſed by heat, and conſequently, that a much ſmaller quantity of ſteam, moſt ſtrongly heated and rarified, will work an engine, than is now applied of cooler ſteam. Which ſmaller quantity of ſteam may be raiſed in ſmaller veſſels, and with ſmaller fires, than are now uſed in working thoſe engines.

Practice.

The ſteam of water may probably be heated and rarified to a very great degree, for the uſe of the fire-engine, by the following method.

To

To the head of the boiler let a pipe of caſt iron be fitted nearly in an horizontal poſition, as in Fig. 3. but inclining a little towards the boiler; and let this pipe be continually kept red hot, by the fire of an air-furnace, through which it may paſs; and thro' this pipe let the watry ſteam be conducted to the cylinder of the fire-engine.

Or the ſteam may be rarified by making it paſs from the boiler to the cylinder, through an iron pipe or cylinder fixed in the flue of the furnace, of which contrivance a rude ſketch is given in Fig. 4.

N. B. The evaporation from the boiler may perhaps be conſiderably quickened by the rarefaction of the ſteam.

It may not be improper to make trial of one or both of the above methods of heating the ſteam, or of other methods, that are more commodious; and alſo to add to the boiler the above recommended apparatus for raiſing a larger quantity of ſteam, by means of mechanical agitation. The fire-engine, as firſt invented by Savery, was rude and imperfect; and ſince his time many ingenious men have been continually making improvements therein; neither doth it yet ſeem to have attained to its greateſt degree of perfection. There is even reaſon to hope that, by one or both of the methods here pointed out, viz. (either by encreaſing the quantity of ſteam, or by augmenting its force) it may be brought to work with much ſmaller boilers, and with a very moderate expence of fuel; and under ſuch circumſtances it might be applied to a vaſt variety of purpoſes, and would become of much greater uſe to mankind.

LXXVI. *Extract of a Letter to the Rev. Dr.* Hales, *F. R. S. from Governor* Belcher's *Lady; dated* Elizabeth town, New-Jerſey, Oct. 22, 1755; *concerning an extraordinary Motion in the Waters in the Lake* Ontario *in* North-America.

Read Feb. 19, 1756.

I Take this opportunity to acquaint you with a ſtrange phænomenon of the lake Ontario, where general Shirley has poſted himſelf with two thouſand men, at fort Oſwego. A perſon lately come from the camp reports, that about a fortnight ſince, that lake roſe and fell five feet and half, three ſeveral times, in the ſpace of half an hour. I wiſh I could ſend you a more particular account of it.

LXXVII. *An Extract of a Letter from Monſ.* Groveſtins, *Maſter of the Horſe to his R. H. the Prince of* Orange, *Lieutenant-General, Commandant of the Forces, concerning an Earthquake felt by himſelf at the* Hague, *on* Wedneſday *the* 18*th of* Feb. 1756. *Tranſlated from the* French, *and communicated by the Rev.* William Parker, *D. D. F. R. S.*

Read Mar. 4, 1756.

ON Wedneſday morning, twelve minutes after eight, we had a ſhock of an earthquake. I was then reading: my chair received

received five ſucceſſive ſhakes. The ſconces in the chamber were in like manner moved. Ten or twelve minutes after, I perceived a ſecond ſhock, but not ſo ſtrong as the former. The water, which I looked upon, remained quiet. The air was calm. There was a little fog. The wind was S.W. Immediately after the earthquake, it turned N.E. The news from Maeſtricht and Utrecht brings word, that they have likewiſe felt it there.

LXXVIII. *An Account of an Earthquake felt in* Holland, Feb. 18. 1756; *in a Letter from Monſieur* Allemand, *Profeſſor of Natural Philoſophy at* Leyden, *and F.R.S. to Mr.* Trembley, *F.R.S. Dated at* Leyden, Feb. 27, 1756. *Tranſlated from the* French.

Read Mar. 4. 1756.

THERE was felt here a violent ſhock of an earthquake on the 18th of this month of February, three or four minutes before eight in the morning. It was not perceived in my houſe, nor in many others: but thoſe perſons, who were in bed, or not in motion, felt it. Two of the bells in this city ſtruck each one ſtroke. A conſiderable number of people were affected with a kind of vertigo, without being ſenſible of the earthquake. It was felt throughout the whole territories of this republic. It occaſioned much confuſion at Amſterdam in ſome churches, where ſervice was performing. Many perſons quitted their houſes at Maeſtricht; but only for a ſhort time. Since the

firſt ſhock on the 18th, at eight in the morning, which threw down ſome chimnies, ſeveral others have been felt in that city.

LXXIX. *An Account of the Earthquakes felt at* Bruſſels; *in a Letter from* John Pringle, *M.D. F.R.S. to* Thomas Birch, *D.D. F.R.S.*

Read Mar. 11, 1756. BY a letter, which I received a few days ago, from Dr. Brady, phyſician to the court at Bruſſels, I find they have felt in that city this winter three ſeveral ſhocks of an earthquake. The firſt was on the 26th of December; the ſecond on the day following; and the third on the 18th of February, being the ſame day it was ſaid to be felt on our coaſt between Margate and Dover; but the hour is not mentioned. All theſe ſhocks, he ſays, greatly alarmed the inhabitants; but were otherwiſe attended with no bad conſequences.

Dr. Brady adds, that he was told by a gentleman from Liege, that the men, who were at work in the coal-pits, and particularly in ſome of the deepeſt, near that city, had aſſured him, that they heard the rumb ling noiſe preceding the ſhock, as over their heads; whilſt thoſe, who were above ground, heard the ſame kind of noiſe as under their feet.

I have incloſed a letter, which, if you think proper, may be laid before the Society, as containing an

an authentic account of the ſinking in of the ſmall river near Pontypool in Wales. It is written by an exciſe-officer in that diſtrict, and was put into my hands by Mr. Windham Bowyer, one of the commiſſioners of that board. I am,

SIR,

Pall-mall, Mar. 11. 1756.

Your moſt obedient

humble ſervant,

John Pringle.

LXXX. *An Account of the Sinking of a River near* Pontypool *in* Monmouthſhire; *in a Letter from Mr.* Edward Matthews, *to the Commiſſioners of the Exciſe.*

Honourable Sirs,

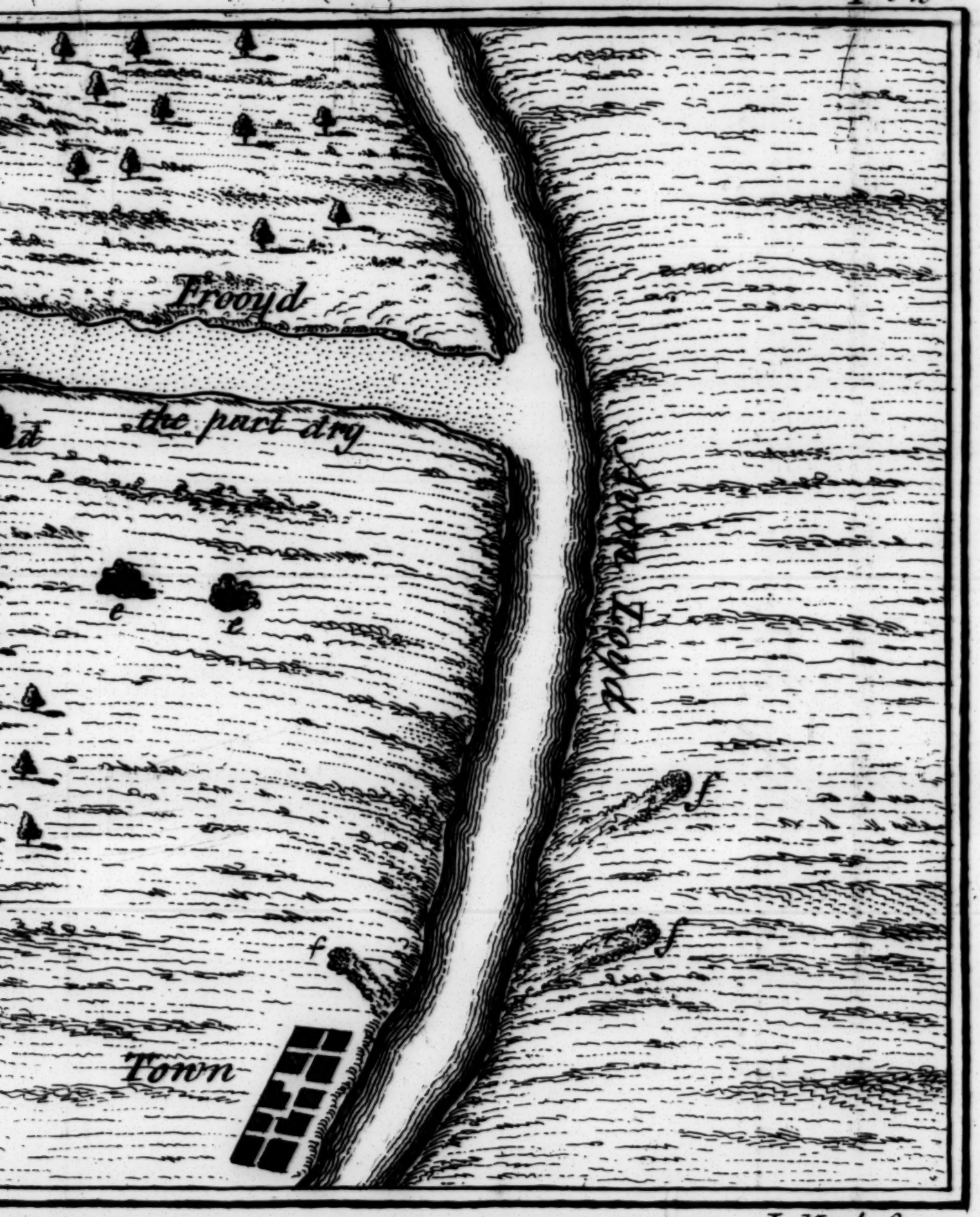
Read Mar. 12, 1756. IN obedience to your honours orders of the 14th inſtant, relating to the ſinking of a river near Pontypool; from my own obſervation laſt Friday (the firſt time I ſaw it) and that of the neighbouring inhabitants, as under, is the beſt account I am able to give of it. The firſt day of January laſt, a poor woman living near its mouth ſent her daughter for water (a great flood appearing in the river juſt before) who returned in ſurprize with the account, that it was dry.

The

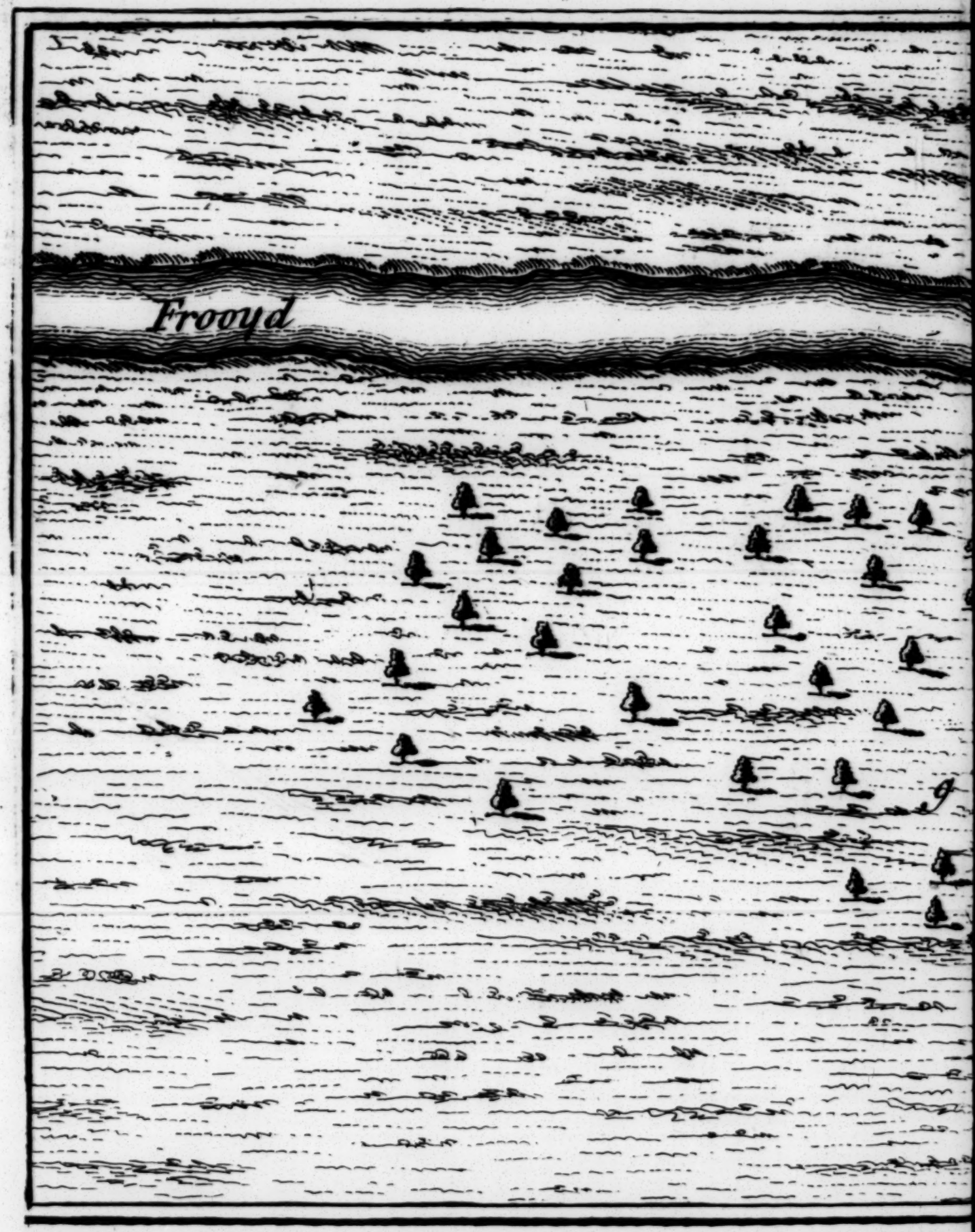
The River is called by the name of Frooyd, running between two ſteep hills, or woods, but not very high: it proceeds from water from the adjacent mountains, and ſeems penn'd up and let out precipitately, to cleanſe the iron ore lying near the ſurface on the ſides of theſe mountains, which greatly diſcolours the water, which at thoſe times, and after heavy rains, is ſo rapid and violent, as to carry down prodigious quantities of large ſtones into another river called Avon Looyd. On Friday laſt I walked up the Frooyd on the bottom of the river, it being quite dry, up to the chaſm, that now receives the water: it is about twenty feet wide; and when its banks are full, about eight or ten feet deep; but now filled up to fifteen feet with ſtones carried in by the water. There's a lime-ſtone rock near the ſurface, about two feet thick, lying in large beds two or three feet ſquare, more or leſs, in ſome places, joined cloſe in others; the joints not ſo cloſe between theſe beds filled up with ſmall gravel, which was by the rapidity of the ſtream ſuppoſed to be waſhed out of thoſe joints over a cavity under the ſaid lime-ſtone rock, and the great weight of water at that time falling from a ſmall precipice juſt above, forced in one of theſe beds of ſtone. The ſides of the pit under the lime-ſtone rock appear to be compoſed of different materials, as gravel and earth, but firm and perpendicular. On one ſide this river near this hole, are three pits ſunk at the ſame time, the one within ten yards, of which there was no appearance before; the other two at about thirty yards up the ſide of the hill (which have been obſerved, for many years, though no body knew the cauſe of them) are now ſunk ſome

yards

Frooyd



J. Mynde sc.


Frooyd

yards deeper, and ſome trees and ſhrubs, that were round the edge of theſe pits, with the ground on which they grew, are ſunk down near the bottom. I believe theſe pits at top may be about twelve yards diameter growing gradually narrower to a center, in ſhape of a funnel or tun-diſh. Under, it is ſuppoſed, is this cavity, through which the river now runs, extending itſelf in one place under the river Avon-Looyd, at about a mile diſtance, where it broke out a few days after, in ſeveral places, on the oppoſite ſide thereof, where were three ſmall ſprings. The reaſon for this conjecture is, theſe ſprings were obſerved to be always clear till a few days after the ſinking of this rock, but now continue to put forth large quantities of this water, which varies in colour agreeable to the water received in at the hole. I am,

Your Honours

Abergavennny, Feb. 22, 1756.

moſt humble and obedient ſervant,

Edward Matthews.

Tab. XVII.

a. The great chaſm, which receives the greateſt part of the water.

b. Gravel waſhed away in the joint of the rock, through which runs into the cavity a conſiderable quantity of water, within four foot of the great hole.

c. A precipice juſt above the chaſm.

d. A hole ſunk in never before obſerved.

e e. Two pits obſerved years ago, now ſunk much deeper.

f f f. Former clear ſmall ſprings, where it is ſuppoſed the water now vents itſelf.

g g. Steep riſing ground, or woods, on each ſide Frooyd, declining towards the Looyd.

LXXXI. *An Account of the Agitation of the Waters, on the 1ſt of* November 1756, *in* Scotland *and at* Hamburgh. *Communicated by* John Pringle, *M. D. F. R. S. in a Letter to the Rev.* Tho. Birch, *D. D. Secret. R. S.*

SIR,

Read Mar. 18, 1756.

THE two incloſed accounts of the agitation of the waters, on the firſt of November laſt, I received ſince the laſt meeting of the Society. One was tranſmitted to me by Dr. Simſon, profeſſor of medicine in the univerſity of St. Andrews, containing the obſervation of Mr. Mark M'Callum, maſter of a Greenland ſhip, who happened to be that day at the Queen's-Ferry, a ſea-port town on the Frith of Forth, about ſeven miles farther up than Leith. The account is addreſſed to the rev. Mr. Dalgleiſh, a friend of Dr. Simſon's, and employed by him to procure the beſt information.

Dr. Simſon, in the ſame letter to me, takes notice of a report, as if the ſame agitation of the water was likewiſe

likewiſe ſeen at Alloa, another ſea-port town about ſixteen miles higher on the Frith; but as he had received no certain account of that circumſtance, he could not anſwer for the truth of it. He concludes with ſaying, that, ſo far as he could be informed, there was no ſenſible agitation of the ſea any-where on the coaſt of Fife; though great part of that county lies upon the Frith, and abounds with inhabitants on the coaſt, who might have made the obſervation.

The other paper is an extract of a letter from Mr. Reimarus, profeſſor of the oriental languages at Hamburgh, to his ſon, Mr. Reimarus, at preſent ſtudent of phyſic in this place. This laſt gentleman wrote to his father, at my requeſt, in order to have an authentic account of what we read in the publick papers, concerning the motion of the candleſticks in the churches, and the agitation of the waters in and about that city on the firſt of November laſt. I am,

SIR,

Your moſt obedient

humble ſervant,

John Pringle.

Pall-mall, 18 Mar. 1756.

SIR,

Read Mar. 18, 1756.

ABout ten o'clock of the forenoon, on the firſt day of November, to the beſt of my remembrance, being then on the pier at Queen's-ferry, I obſerved the water to riſe

very ſuddenly, and return again with the ſame motion, which I judged to be about a foot, or eighteen inches perpendicular, which made the barks and boats then afloat run forwards and backwards on their ropes with great rapidity; and this continued for three or four minutes, it being then calm; but after the ſecond or third ruſh of water, it always grew leſs: And this is the neareſt calculation I can make.

Mark M'Callum.

Read Mar. 18, 1756. THE following phænomena are well vouched to have happened at Hambourg, the firſt of November 1755. In one of the Churches many perſons, that were preſent, obſerved an agitation of the branched candleſticks hanging from the roof, about one o'clock after noon. In another church, the cover of the baptiſtery hanging from the roof was alſo remarked to be agitated: and the like motions are ſaid to have happened in other churches. It is likewiſe ſure, that the water in the canal thro' the town, and in the river Alſter, was agitated the ſame day. It is deſcribed firſt to have formed ſeveral gentle whirlpools, from thence to have riſen more and more impetuouſly, throwing about mud brought up from the bottom, and at laſt to have ſubſided with a copious white froth. The Elbe is ſaid to have riſen in ſome places ſtill more violently.

LXXXII. *Microſcopical Obſervations: In a Letter from* Edward Wright, *Eſq; to Mr.* Peter Collinſon, *F. R. S. dated at* Paris, Decemb. 26, 1755.

Read Mar. 18, 1756. IT appears from Mr. Needham's experiments, and thoſe of Monſ. de Buffon, that animal and vegetable ſubſtances infuſed in boiling water, put into bottles completely filled, and ſo cloſely ſtopped, that no air can enter, and even kept for ſome time in hot aſhes, that in caſe there ſhould be any latent ova of inſects, they may effectually be deſtroyed; it appears, I ſay, from the experiments of theſe gentlemen, that ſuch ſubſtances, notwithſtanding ſuch precautions, afford microſcopical animalcules of various kinds, and that ſooner or later, according to the greater or leſs degree of exaltation in in the ſubſtances. Hence they conclude, that there is a real productive force in nature, by which theſe animalcula are formed.

Having read the accounts of theſe experiments, I was deſirous to make ſome of the ſame kind, which I accordingly did, in the ſummer of the year 1752.

Though the greateſt part of the animal ſubſtances, upon which I made any experiments treated in the manner above-mentioned, yielded, ſooner or later, great numbers of microſcopical animalcules; yet moſt of the vegetable ſubſtances, whether from the coldneſs of the ſeaſon, which was not very favourable that year with us, or for ſome fault in preparing the infuſion, intirely failed, and underwent a fermentation,

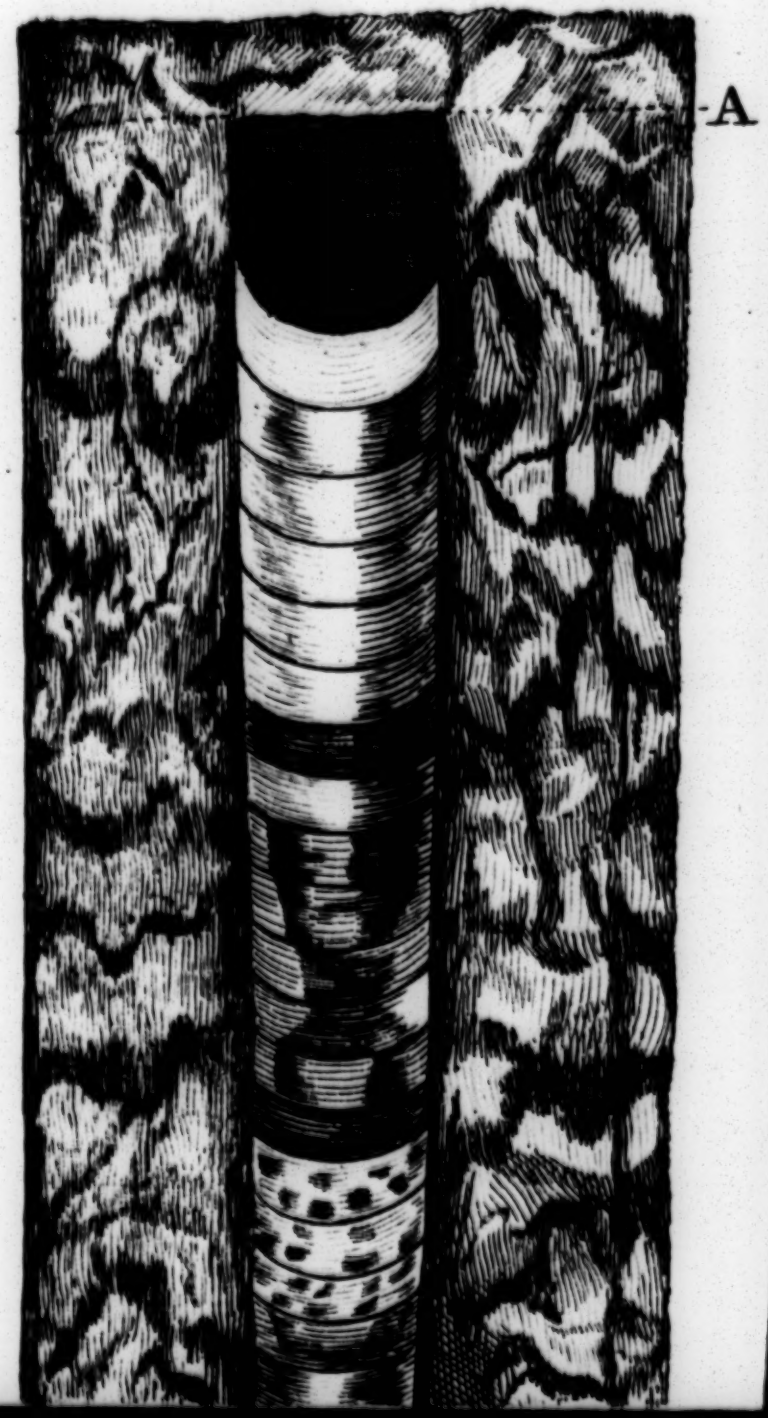
tion, without ever giving the ſmalleſt marks of any thing endowed with life.

As I had little leiſure, my experiments were neither ſo numerous nor ſo well managed, as I could have wiſhed; nor did I take notes of the event of any, except that of two, which I made upon millepedes and cantharides, ſubſtances much uſed in medicine, which renders obſervations upon them ſo much the more intereſting.

May 1ſt, 1752, at eleven o'clock forenoon, I made an infuſion of dried millepedes, or wood-lice, ſuch as are commonly kept in our apothecaries ſhops. Theſe I put unbruiſed into a ſmall phial, ſo as to make it half full; then poured upon them as much boiling water as filled it neck and all, ſtopped it with a well maſticated cork, and put it into a pocket, where it was kept in a mild degree of warmth. I let it remain till ten o'clock the ſame evening, when I examined a drop of the infuſion with the higheſt magnifier of a very good microſcope made by Mr. Clarke of Edinburgh. I found the whole ſwarming with oblong, ſlender, flattiſh pellucid animalcules, pretty nearly of the ſame breadth throughout the whole length of their bodies, and without any appearance of a tail (*ſee* TAB. XXII. Fig. 1.) all evidently of the ſame kind, though not all of the ſame length and dimenſions, extremely vivid, and, as appeared pretty evident to me, ſpontaneous in their motions, which they performed in all directions in an undulatory, vermicular way.

Upon obſerving the ſpeedy appearance of theſe animalcules, I wiſhed to know, in how ſhort a time they might be produced; for which purpoſe,

Fig. 2.



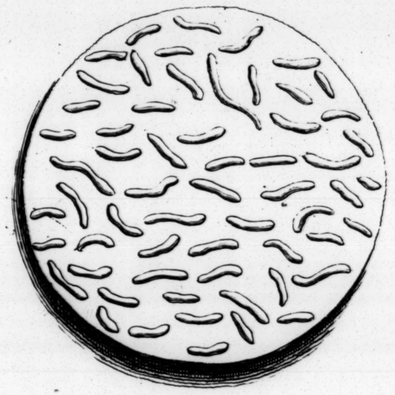
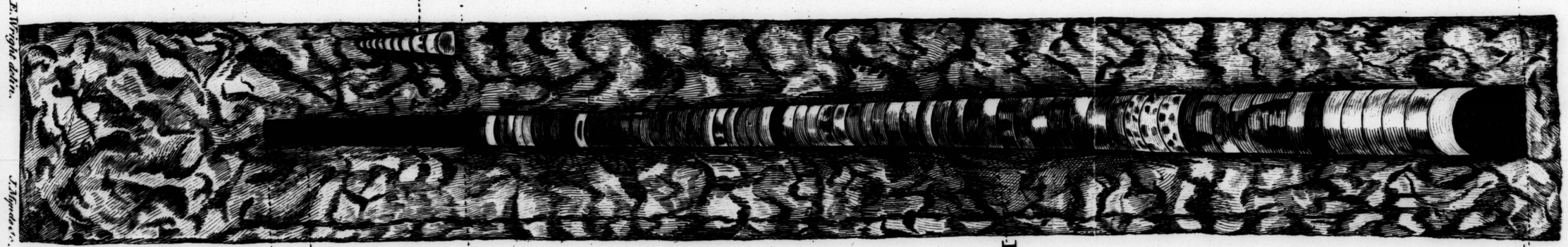


Fig. 1.

Fig. 2.

Fig. 3.



E. Wright delin. *J. Mynde sc.*

May 3d, I made juſt ſuch another infuſion, put it into my pocket, as before, and an hour afterwards laid a drop of it before the microſcope, while it was as yet milk warm. I obſerved a very few of theſe minute bodies moving about briſkly in the fluid. An hour after this more of them appeared; and before the end of the third hour, the infuſion contained a great number of them. They continued however to increaſe in numbers for an hour or two afterwards, when the infuſion ſeemed to have produced all that it was capable of.

June 3d. I made an infuſion in the ſame way of unbruiſed cantharides, and in much about the ſame time found the whole ſwarming with animalcules of the ſame kind as thoſe of the infuſion of millepedes.

Theſe bodies, which at firſt appeared larger than thoſe in ſemine maſculino, were very ſoon decompoſed into ſmaller ones, to ſpeak according to the doctrine of Meſſrs. Needham and Buffon, or, as others would rather incline to expreſs it, ſucceeded by ſmaller ones, theſe again by others ſtill ſmaller, and ſo on, until in a few days, the higheſt magnifier of my microſcope could exhibit nothing diſtinct to the eye.

The ſame ſubſtances infuſed in rectified ſpirits of wine, or other ſpirituous liquors, ſhewed none of theſe bodies, and a few drops of ſuch liquors, or of a ſolution of fixt or volatile alcaline ſalts poured into the infuſions, inſtantly deſtroyed the animalcules.

I ſhall not take up time in enquiring, whether theſe animalcules are produced by the decompoſition of the ſubſtances, in which we obſerve them, which, according to Monſ. de Buffon contain a number of

living

living organic particles, or, according to Mr. Needham, a vegetating force in every microſcopical point, capable of forming ſecondary combinations, microſcopical plants, zoophytes or animalcules, according to the greater or leſs degree of exaltation, which the ſeveral ſubſtances have attained. Or whether they proceed from ova formerly exiſting in the ſubſtances, and capable of enduring a great degree of heat, without being deſtroyed, the germs of which are ſooner or later developed according to the fitneſs of the nidus, as is the opinion of the learned and ingenious Dr. Parſons, in his treatiſe of the analogy between the propagation of animals and that of vegetables.

As by entering into a diſcuſſion of theſe different ſentiments, one might write a large volume without perhaps going to the bottom of the matter, I ſhall here only obſerve, that whichſoever of theſe opinions we embrace, thus far ſeems to be certain, that the earlier or later appearance of microſcopical animalcules is always in proportion to the degree of tendency to putrefaction in ſuch ſubſtances as afford them. This is the caſe not only with them, but likewiſe with maggots in meat, which all the world knows to be produced from the eggs of flies.

The two ſubſtances millepedes and cantharides, upon which the above obſervations were made, are remarkably putreſcent, and the infuſions of them ſtunk abominably in a very ſhort time.

Caſtor, though an animal ſubſtance, and ſeemingly very much exalted, treated in the ſame manner as the above-mentioned ſubſtances, viewed by the microſcope every day, and kept for ſeveral months, afforded no animalcules, nor ſeemed to have

under-

undergone the ſmalleſt change; which confirms what the ingenious Doctor Pringle has obſerved, that it is antiſeptic; and adds weight to the obſervation, which I made above, that the appearance of ſuch animalcules denotes a tendency to putrefaction. Hence I am of opinion, that ſuch microſcopical obſervations made with care and accuracy, might be uſefully applied in the inveſtigation of the ſeptic and antiſeptic qualities of animal and vegetable ſubſtances, ſince in this way the firſt motion of putrefaction may be diſcovered before it manifeſts itſelf otherwiſe.

As every one would wiſh, if poſſible, to render his ſtudies or obſervations (however philoſophical, or otherwiſe agreeable they may be) in ſome ſhape ſubſervient to the good of mankind, here ſeems to be pointed out a new and intereſting field of enquiry for thoſe, who delight in microſcopical reſearches.

Before I conclude, I muſt beg leave to ſubjoin a few remarks concerning exaltation, which ſeem to deſerve atttention.

All exaltation appears to be a certain modification of the ſalts and oils of bodies: a proper degree of it favours growth and vegetation, and ſuſtains animal life: a greater degree of it, which I would call the putrefactive exaltation, and to which all organized bodies tend more or leſs, decompoſes all ſuch bodies, and favours the production of microſcopical animalcules, or the developement of the ova, from whence they may be hatched. A ſtill higher degree of exaltation puts a ſtop to this proceſs, as likewiſe to vegetation, and in certain circumſtances even to animal life, as happens with regard to all acrid

chemical preparations, &c. whether of the animal or vegetable kingdom.

Thoſe, who imagine, that all ſalts and oils hurt the vegetating force of matter, have fallen into a great error; for from whence can ſuch a vegetating force proceed, but from a due mixture and modification of the ſalts and oils with the earthy principle, which all the world allows to be of itſelf inert?

It is true indeed, that a very large portion of ſalts or oils renders ſubſtances antiſeptic, or very ſlow either of vegetation or putrefaction, as is well known with regard to ſea-ſalt, a large quantity of which preſerves ſubſtances from putrefaction; though, as the learned Dr. Pringle obſerves, a ſmaller one rather forwards that proceſs, as it does likewiſe vegetation. Caſtor, which as I formerly obſerved, is antiſeptic, ſeems to owe this quality to nothing elſe but a large quantity of a ſluggiſh fetid oil, which it contains.

LXXXIII. *An Account of a Cure of a paralytic Arm, by Electricity: In a Letter from* Cheney Hart, *M.D. to Mr.* William Watſon, *F.R.S.*

Salop, March 20, 1756.

Read Mar. 25, 1756.

THough 'tis a long time ſince I had occaſion to write to you, yet I take the liberty of now troubling you with a letter, to acquaint you with the caſe of a young woman I lately have had under my care at the infirmary here, upon whom

whom the electrical operations have had greater good effect than I have ever elſe been able to obſerve. Elizabeth Stokes, aged twenty-three, a very luſty and healthy woman, was, in the beginning of January laſt, ſeized with a rheumatic kind of pain in her right arm, particularly about the wriſt; and in two or three days time afterwards, the finger and thumb of that hand contracted up ſo cloſe, that they could not be opened with any force the girl herſelf could uſe to them. In this manner ſhe continued till January 17, when ſhe came to our infirmary: her hand and fingers then ſeemed to be greatly ſwelled, but cloſe drawn together; her arm was pained from the contraction of her hand; and from a creeping pain ſhe felt about her wriſt and elbow, ſhe was apprehenſive thoſe joints were about to be drawn up as the hand. She had at this time loſt all kind of ſenſation in the hand itſelf, which felt cold to the touch, and looked livid. In every other reſpect ſhe was in perfect health. Imagining the contraction a conſequence of the rheumatic pain, I adviſed her to the uſe of gum-guaiac. twice a day, with a julep of ſpir. mindereri, *&c.* as in our own Pharmacopeia, and to rub the part affected well, thrice a day, with a fleſh-bruſh, and afterwards with linimentum ſaponaceum. This ſhe continued five days without the leaſt obſervable alteration; when finding her no better, I directed our apothecary, Mr. Winnal, to draw the electrical ſparks from the contracted hand, and to communicate the ſhock alſo, by means of the wire-chain tied about her wriſt from the ſuſpended phial. This he undertook to do on Friday the 23d, and for the firſt half hour the girl did not ſeem at all ſenſible of the

electrical ſtrokes; but after about 30 minutes, ſhe ſaid they gave her pain in that hand, and in about ten minutes more her fingers began to tremble and open ſo much, that we could eaſily ſeparate them, and by degrees extend them all. After this the ſhock was given to the palm of her hand, to each finger ſeparately, and to the thumb and wriſt for about ten minutes longer, when the whole were become perfectly pliable and ſoft, and ſhe could open and ſhut the hand herſelf, without aſſiſtance, and without pain; though ſhe found herſelf unable to uſe thoſe fingers very freely, they being very weak, as well as that wriſt. We then rubbed the hand and wriſt well with opodeldoc, and wrapt it up cloſe in flannel, and recommended to her to repeat the rubbing it frequently through that day, and continue her guaiacum as before. She remained very eaſy and well all day, but at night her hand began to be more painful, and ſhe expreſſed a great fear, leſt it ſhould contract again, as ſhe felt a creeping pain in all the inſide of her arm. However, by repeated friction with the fleſh-bruſh and opodeldoc, this went off, and next morning ſhe had no complaint in her arm or elſewhere. She was again electrified this ſecond day about the hand, which remained open and pliable enough, and the operation was repeated every day for a week after, (tho' the contraction never returned again) till the ſhock began to be ſo painful, that ſhe deſired to be excuſed from it any more, and, as ſhe ſeemed quite well, ſhe was diſcharged as cured from the infirmary on January the thirty-firſt.

As ſhe was a working ſervant to a family in the country, ſhe returned to her buſineſs with the ſame

eaſe

eaſe as formerly before this contraction, and continued well till on February ninth or tenth, when being obliged to waſh clothes from morning till night, that ſame evening after the waſhing was finiſhed, ſhe felt her fingers and arm grow painful firſt, and in leſs than an hour's time they contracted, as they had done before. Attempts were immediately uſed by herſelf and the family to draw the fingers open, but in vain, and whenever they tried to force them open, they gave the girl moſt violent pain through that whole arm. On this ſhe was brought back to our infirmary again, Feb. 13, and electrified as before, in the preſence of myſelf and ſeveral gentlemen of this place. Her hand was now as cloſely contracted as ſeemed poſſible for the fingers to be drawn, and ſhe had no ſenſation of heat or cold upon it, nor pain. The wire from the ſuſpended phial being tied round that wriſt, ſhe applied her hand to the electrified conductor, and received repeated ſtrokes, and ſome very ſtrong ones, for 40 minutes before ſhe felt any pain from it, or the fingers relaxed any at all; and we rubbed her frequently with the fleſh-bruſh betwixt whiles, and tried to ſtir her fingers. After about 45 minutes, ſhe ſaid, each time ſhe received the electrical ſhock, it gave her much pain, and then her firſt finger began to move a little, after that the ſecond, and the third, and the thumb, till at length they were all opened and relaxed, and by repeated frictions and electrical ſtrokes, for about an hour and 20 minutes, the motion of the hand was quite reſtored. I then directed it to be rubbed well with opodeldoc and covered with flannel, to keep it warm, and heard no more of her till ſeven o'clock

at

at night, when her arm was become vaſtly painful, her fingers trembled and drew up a little, and the inſide of the fore arm felt all knotty, and as if the muſcles there were drawn like cords, and the whole hand and arm was ſore. In this caſe I would have had ſome blood taken immediately from that arm; but upon inquiry I found her menſes were upon her ſince the electrifying in the morning. I therefore only ordered a bliſter above the elbow of that arm, and a proportionate quantity of tinctura Thebaica to be added to the linimentum ſaponaceum, with which her fore arm and hand were to be well rubbed. Theſe applications ſoon took off the threatning ſymptoms, and next morning ſhe was eaſy; the knots in her arm almoſt quite diſappeared, and ſhe could move her fingers very well. She was electrified the ſecond day about ten minutes, but no longer, as it ſeemed unneceſſary; and from this time was electrified no more, but continued the anodyne liniment every day, with the uſe of the fleſh-bruſh, for about ten or twelve days longer, when ſhe appeared perfectly well as before, and her fingers could be uſed and moved with eaſe. Nevertheleſs, to prevent a return, I directed an iſſue to be cut in that arm, and worn conſtantly, which ſhe had done, and ſhe had alſo a ſtrengthening plaiſter about her wriſt, as ſhe ſaid that was weaker than it ſhould be. This was the whole of her treatment. She was kept a patient here till this day, March 20, when, as her diſorder has no more returned, and ſhe can move her fingers perfectly well, ſhe was diſcharged from hence cured.

I will not weary you with remarks upon this caſe, nor on the ſtrong hints it affords of the wonderful

force

force and virtue of electricity in rheumatic or ſpaſmodic diſorders. Certainly it is worth while to make further experiments to aſcertain its uſe in medicine, as well as in philoſophy. The Swediſh experiments made by Dr. Zetzell, (as related in the *Gentleman's Magazine*, 1755, p. 314) directed me to the trial of it in this caſe, wherein I have the pleaſure to ſee an admirable agreement in the effect here and in Sweden. As ſuch therefore I ſend this account to you, which, if you think it may be of uſe, you are at liberty to communicate to the gentlemen of your Society, for whom I have a great eſteem, and ſhould be glad to hear, at your leiſure, from you, what new diſcoveries have been made by any of you this winter, in any of the arts or ſciences. I muſt now beg leave to conclude with ſubſcribing myſelf,

Dear Sir,

Your very obedient humble ſervant,

Cheney Hart.

LXXXIV.

LXXXIV. *Obſervations made upon the* Brimſtone-Hill (*in* French La Souffriere) *in the Iſland of* Guadelupa; *by* John Andrew Peyſſonel, *M. D. Member of the Royal Academies of Sciences of* Paris *and* Montpelier, *and of* Marſeilles *and* Rouen; *the King of* France's *Phyſician and Botaniſt heretofore on the Coaſt of* Barbary, *and now in the Iſland of* Guadelupa, *F. R. S. Tranſlated from the* French *by* M. Maty, *M. D. and F. R. S.*

Read Mar. 25, 1756.

THE Iſland of Guadelupa is not the only one of the American Antilles, that has Volcanoes and mines of brimſtone; few are without them. They are to be found in Martinico, Dominica, St. Chriſtopher's, St. Lucia; and all theſe iſlands produce ſulphur, pumice-ſtones, and other ſubſtances uſually found in Volcanoes.

The mountain, upon which I made my obſervations, is called La Souffriere, or Brimſtone-hill, becauſe it contains ores of ſulphur; and its ſummit conſtantly emits ſmoke, and ſometimes flames. It is very high, and forms a kind of truncated cone. It riſes above the chain of mountains, that occupy the center of the iſland, and run through all its length from North to South. This conical mountain is about three leagues from the ſea ſhore, Eaſt, Weſt, and South, and therefore almoſt in the middle of the Southern part of the iſland.

The

The journey up this mountain is not now ſo difficult as it was in the time of father Labat, in the year 1695. Much more commodious roads are now uſed than that which he followed. Travellers generally lie at ſome houſe at the foot of the mountain. From thence they go on horſeback as far as the torrent, where they have the choice of two different ways. The firſt begins at a place called Les Gommiers, or The Gum-trees, along the river of Galleons; the other lies towards the middle of the mountain, at a place called Tarare, where they croſs the river St. Lewis.

You generally ſet out early from the place where you have ſpent the night, and breakfaſt in the cool of the morning, on the banks of one of the rivers, whoſe waters are very clear and good, and produce great quantities of ſmall fiſh, ſuch as cray-fiſh, bull-heads, eels, &c. This is one of thoſe delights ſo emphatically deſcribed by father du Tertre. We perceived theſe waters to be diuretic, by the ſudden effect they had upon us.

We took the road of the Gum-Trees as being the eaſieſt. I ſoon obſerved, that the woods differed in kind, as we aſcended; the trees are ſmaller, and are no more than ſhrubs at the top, that is to ſay, on a level with the other mountains. Here you meet with none but mountain-mangles, whoſe wood is crooked and bends downwards. The bark of theſe mangles is a true jeſuit's bark*. When we had paſſed through this foreſt of mangles, which are as

* F. Labat made the ſame obſervation. See *Voyage aux Iſles de l'Amerique*. Tom. II.

a curtain, we got into the ſavannah. A ſavannah in this country is a kind of natural meadow. This particular one is made up of fern, moſs, a ſort of ananas, and wild aloes, and ſuch-like plants, without either tree or ſhrub. I believe we met with almoſt all the hundred different ſorts of fern, which make up father Plumiere's voluminous work.

We walked on for about 600 paces, in a path that goes through this ſavannah. The way is rugged. The ananas, that are very buſhy and above two feet high, conceal the roots and rocks, which makes walking very troubleſome. About nine in the morning, after an hour's march from the place, where we had breakfaſted, we arrived at the ſpring-head of the river of galleons, South of the Brimſtone-hill. At the place called The Three Springs, we found the the waters ſo hot as not to be borne. The neighbouring ground ſmokes, and is full of brown earth like the droſs of iron. In other places the earth is red like colcothar, and even dyes one's fingers; but theſe earths are taſteleſs. Near theſe three burning hot ſprings are ſome others, that are lukewarm, and ſome very cold. We put ſome eggs into the hot ones, and they were boiled in three minutes, and hard in ſeven.

I had brought a hydrometer, or inſtrument to weigh liquors, which plunged ſix lines in the common water of the rivers to leeward, and two lines in ſea water. It ſunk twelve lines in the hot, and eight in the lukewarm ſprings.

When we had made our obſervations on the different ſorts of earth and water, we entered a valley between The Brimſtone-hill and the mountain, that

lies

lies Southward, called The Mountain of the Three Rivers. Here we met ſome negroes carrying brimſtone to ſell it in the low-lands. We walked in the ſame ſavannah, and among the ſame weeds, which grew ſo thick, that we could not diſcover the nature of the ſoil.

We went on, about the length of 400 paces, when we began to get ſight of the windward, or of the Eaſtern coaſt of the iſland. Having likewiſe diſcovered the burning gulph to the Northward of us, we crawled up to get at it. We were obliged to help ourſelves with our hands, feet, elbows, and knees, and to hold by the fern, aloes, and other plants, ſome of which were prickly, and very troubleſome. We were about an hour and a half getting up to the hight of about 500 feet; tis true we might have taken a ſmoother way by going round about. At laſt, quite out of breath, we reached the gulph, at the place whence the ſmoke iſſues. This place is at the foot of a ſteep bank, and may be about 25 toiſes in breadth: there is no graſs to be ſeen, nothing but ſulphur and calcined earth; the ground is full of crevices, which emit ſmoke or vapours; theſe cracks are deep, and you hear the ſulphur boil. Its vapours riſing yield very fine chemical flowers, or a pure and refined ſulphur. It is chiefly found in thoſe places where the earth lies hollow, and upon the chinks or funnels you ſee the ſpirit of ſulphur run down like fair water, and you breathe an intolerable ſmell of brimſtone. The ground is looſe, inſomuch that we could thruſt our canes up to the head, and drew them out as hot, as if we had plunged them into lime when it is ſlaking. Having inadvertently run

ourſelves into this looſe ground among theſe chinks, and being ſmothered with the ſmoke or vapours, we were continually afraid of ſinking, and meeting with ſome hole or pit, and ſo tumbling into hell from the top of this mountain, which we imagined to be one of the vents of the infernal regions, or a mouth of the burning gulph; and we expected to periſh like Pliny the naturaliſt, who was ſmothered by the flames of Veſuvius, which is ſaid to have have happened in the 79th year of the Chriſtian æra, at the time of that great earthquake, which, having overturned whole cities, drove the aſhes as far as Africa, Syria and Egypt. I confeſs, the diſtance, that theſe aſhes are ſaid to have travelled thro' the air, appears to me to be very great, for Italy is near a thouſand leagues from Syria.

We haſtened out of this dangerous ſituation, and continued climbing to the top of the mountain, keeping to the Eaſt, or windward. When we got to the ſummit, we diſcovered another gulph or funnel, that opened ſome years ſince, and emits nothing but ſmoke. The top of the mountain is, as father Du Tertre ſays, a very uneven plain, covered with heaps of burnt and calcined earth of various ſizes; the ground ſmokes only at the new funnel, but appears to have formerly burnt in many places; for we obſerved abundance of theſe crevices, and even gutters, and very large and deep chinks, which muſt have burnt in former times.

The ſame reaſons, that obliged us to quit the burning gulph, probably hindered father Labat from viewing this ſummit, and prevented his coming at the knowledge of a very deep abyſs, or precipice, which is in the middle of this flat.

It is ſaid, there was once a great earthquake in this iſland, and that The Brimſtone-hill took fire, and vomited aſhes on all ſides. This mountain then cleft in two; but it is not ſaid what year this phænomenon happened. I am apt to think it was then, that this abyſs or precipice opened. Perhaps the Volcano having been fired by lightning, the ſalts of the earth joined with the ſulphur produced the effect of gunpowder, and occaſioned this dreadful earthquake. The mountain having ſplit, caſt forth aſhes and ſulphureous matters all around, and from that time no earthquake has been felt in the iſland.

Theſe phænomena are but too common in Italy, particularly in the kingdom of Naples; and in other countries where there are Volcano's, we are told of moſt terrible diſaſters of this kind. In 1556 a Volcano in the iſland of Java poured forth a torrent of melted and burning ſulphur with ſuch impetuoſity, that ten thouſand perſons periſhed in three days. The ſame year mount Guamanapi, in one of the Bandava iſlands, made terrible havock; the waters of the ſea were heated to ſuch a degree near the iſland, that the fiſh were found ready boiled upon the ſtrand, but we don't hear, that any of thoſe mountains ever ſplit in two like this.

We cannot doubt of the dreadful effects, which have been, and ſtill are produced by earthquakes: witneſs the laſt that happened at Jamaica, and now that of Liſbon.

The abyſs I am ſpeaking of, is in the middle of the flat, behind two crags or points, that riſe above the mountain, and on the North ſide anſwers to the great cleft, which goes down above a thouſand feet perpen-

perpendicular, and penetrates above a hundred paces into the flat, and is more than twenty feet broad; ſo that in this place the mountain is fairly ſplit, from the top down to the baſis of the cone.

On the North ſide, oppoſite to the cleft, and at the foot of the mountain, in a little plain, is a pool, which is ſaid to ebb and flow like the ſea, and to increaſe and decreaſe at certain times, according to the periods of the moon: but people are fond of aſcribing wonderful properties to things, which, if ſimply related, would not appear ſo extraordinary. For my part, I am apt to think this pool is formed by the waters that drain along the great cleft into this little plain, where the ſame earthquake has ſunk a hollow place near the great ſubterranean cavern, of which by and by; and that the variations of the water in this pool are occaſioned by the rains.

It was about noon when we got upon the flat, on the ſummit of the mountain. It looks as if it had formerly been of a conical figure, and had loſt its top by earthquakes. What confirms me in this conjecture is, the pieces of rock, which ſtill ſubſiſt, and form thoſe ſpires, or little cones, that are ſcattered here and there upon the ſummit; the two moſt conſiderable of which are towards the Weſt, and make as it were, a pair of horns to the mountain.

Here we dined, and reſted above an hour. There is a moſt delightful proſpect. You diſcover below the iſlands of Martinico, Dominica, The Saints, Marigalante, and the whole extent of Guadelupa. Tis ſaid, thoſe of St. Vincent, St. Kits, and even St. Martin, have been ſeen from the top of this mountain. Be that as it will, we obſerved very diſtinctly

Mont-

Montſerrat, Antigua, Nevis, Radonde, and ſeveral other iſlands.

The air at top is bleak and ſharp, but I can't ſay I found the cold very intenſe. It is true many negroes have periſhed there with cold; but that is not to be wondered at, as theſe people are not inured to the ſeverity of the weather, and go naked; they wear no clothes but a pair of drawers, and have nothing to eat. Sometimes they are catched in the rain, or expoſed to damps and fogs; or elſe when they are all in a ſweat with fatigue and labour, and lie down to reſt, the cold ſeizes them and chills their blood; and it is no wonder, if they periſh in this condition.

Beſides the fine proſpect you enjoy at the top of this mountain, you have the pleaſure, as father Du Tertre obſerves, of ſeeing the clouds gather below, and hearing the thunder rumble under your feet. We actually ſaw the clouds riſe from the ſea, and ſpread over the land on the ſide of the wind, ſometimes paſſing where we ſtood, and ſometimes lower. Theſe clouds are no other than damp fogs. The Brimſtone-hill is ſeldom clear of theſe damps.

As my thermometers and barometers were broke in going up, I could make no obſervations on the gravity and properties of the air. It was but in my ſubſequent journies to this mountain, that I could in ſome meaſure gratify my curioſity in theſe particnlars. We had only time to examine the great cavern and the great cleft above it, and then withdrew to the habitation whence we came, being very weary; for in coming down we were often obliged to ſlide, ſometimes ſitting, ſometimes lying on our backs, and holding by the fern. We frequently tumbled into holes,

where we were almoſt buried, but were in no great danger, becauſe the fern and moſs make a kind of down, pretty rough indeed, which prevents the hurt of a fall; but all this is very tireſome. We met with abundance of holes or neſts of black devils, a kind of ſea birds, that come from the north, and hatch their young upon this mountain. The birds alone would require a diſſertation, which I hope to give hereafter.

Second Journey to The Brimſtone-hill.

My curioſity was not ſatisfied; I wanted to make more accurate obſervations, and take a more exact view of this mountain. We climbed up a ſecond time with the ſame and ſtill greater difficulties, becauſe we took the road, that leads to the middle of the mountain. This road is called Tarare, and was to bring us to the pool near the great cleft and the great cavern. I had provided myſelf with all neceſſaries for making obſervations.

We arrived at the little plain, where the pool is. The three times I have ſeen it, it was little more than 20 or 25 feet ſquare, and contained but little water, which was very ill taſted, and ſo impregnated with alum as not to be fit to drink. It is ſituated oppoſite to the great cleft, about an hundred paces from the great cavern, that is under the cleft. As I intended to lie there, when we got to the place, we pick'd up ſome wood, kindled a fire, made bundles of fern, and fetch'd water from the head of the river St. Lewis.

We took up our lodging in that great cavern, that anſwers perpendicularly to the cleft of the mountain.

It

It has no doubt been formed by the ſame earthquake, that ſplit the mountain in two parts nearly equal. The parting goes North and South; to the North is the cleft and the cavern, in the middle the abyſs, and to the South the burning gulph; the whole on a direct line.

This cave appears at firſt ſight very deep, but you get down with eaſe. At the entrance it may be about twenty 20 or 25 feet wide, as much in hight, and about 60 paces deep. At the bottom is a kind of pool, formed by the waters, that drain or ouze from different parts of the vault. The bottom of this pool appears to be an exceeding fine miry earth, like clay mixed with aſhes. The water, that diſtills in theſe places, is very acid, aſtringent, ſharp, and taſtes of alum. The water of the other pool on the outſide is much of the ſame nature, but contains fewer ſalts; which is a proof, that theſe two pools are both filled with the waters, that drain from the great cleft. The interior pool may be about 15 feet wide acroſs the cave: They have thrown up a kind of bank, made of rocks, to croſs it without ſinking into the mud. Before we entered the cave, we lighted ſome torches made of candle-wood, which I had taken care to provide. The candle-wood is full of reſin and very inflammable; the inhabitants cut it in ſplinters, and tie it up in bundles, which they call torches. When they were well lighted, we croſſed the pool, and got upon a ſmall eminence made of ſtones, that have fallen or ſeparated from the vault: you then go down into a great hole or cave, about ſixty feet in length, as much in breadth, and forty in height. Here the heat is mo-

derate. My guide got up upon a ſecond eminence, but told us he was ſtifled, and could advance no further; and indeed his torch was going out. This ſecond eminence, or riſing, is likewiſe formed by ſtones falling from the vault. They are a kind of whitiſh free-ſtone, covered and incruſted with a very ſharp, white, aluminous ſalt. I then took a torch, and having left a negro at the entrance with another torch to fetch us out, in caſe of need, we entered the the third cave. Here the heat is exceſſive, the torch gave no light, and was almoſt extinguiſhed for want of air, ſo that we were obliged to wave it about continually. We could hardly fetch breath, and were covered with ſweat, and found nothing remarkable but this violent heat. The vault ends here, and we could go no further. We perceived on the left, at coming in, a great hollow place, where we heard the falling of water; we imagined the vault continued on that ſide, and ſtepping down were agreeably ſurpriſed to find it cool, and that our torches revived. The ſpace of one fathom made this alteration; for holding our torches in the right hand extended, they could hardly burn; whereas in the left ſtretched out, they burnt very clear This puts me in mind of what happens in the *Grotta de' Cani*, near Pozzuolo in Italy, deſcribed by Miſſon, vol ii. p. 63. let. 23. too long to be related here.

I went down to the bottom of this hole, where I found nothing but a ſurprizing cool air. Afterwards we found ſeveral holes full of water, leſs impregnated with ſalt and alum than that at the entrance. When we came up again, in order to proceed on our way, we were ſuffocated with the ſame heat we had felt in coming

coming in. I endeavoured to advance to the right of the cave, but the heat was ſo violent, that it ſtopt my breath.

It appeared to me pretty extraordinary, that in one and the ſame cave, 300 feet under-ground, there ſhould be ſuch a ſtifling heat on one ſide, and on the other ſuch an agreeable freſh air. Perhaps the cool ſide anſwers to ſome vent, or communicates with the great cleft by ſome unknown channel, thro' which the outward air penetrates and cools the place.

In coming out we took care to reſt a conſiderable time in the ſecond cave, to let the violent heat go off, and to dry our ſhirts, that were ſoaked through with ſweat. We brought away ſome of the incruſtations, and ſome of the aluminous ſalt, which I found to be a true alum.

When we came out, I perceived two remarkable things upon my waiſtcoat; firſt, that the ſilver lace was gilt, and looked like tarniſhed gold lace: but this I was not ſurprized at, as I knew, that ſulphur mixed with ſalt of tartar will produce that effect: ſecondly, that the drops of water, which were fallen upon me, were by the heat of the cave turned to alum, and had dried and faſtened upon my cloaths. In this cave we found the ſame ſorts of earth as we had met with at the three ſprings of the river of Galleons, as I mentioned above. They dyed our fingers, and were taſteleſs, as the former. This is all I obſerved in the interior cave.

We ſpent the night in the great cavern. I had brought with me a thermometer and a barometer; but this laſt was broke by the way, ſo that I could

make no obſervations upon the weight of the air; but with the thermometer I obſerved, that when we got there, in rainy weather, the glaſs ſhewed 15 degrees above temperate, at ſun-ſet 2 degrees; in the night 5 degrees below temperate; and at day-break 8 degrees. The thermometer, placed at the entrance of the cave, and ſheltered from the wind, ſhewed 5 degrees of cold; and expoſed to the wind on the outſide, where I felt a very ſharp cold, only 2 degrees; ſo that there was three degrees difference, which ſurprized me, as my natural thermometer, I mean my body, convinced me of the contrary. I was very cold without, and felt little or no cold within; whereas the obſervations by the thermometer ſhewed the reverſe. I had obſerved in the plains below, that it ſhewed about 10 degrees above temperate. By the report, that was made us, the night we ſpent at the brimſtone-hill had been as cold, the wind had blown, the air was very damp, and we had found but 5 degrees of cold; ſo that there was 18 degrees difference between the brimſtone hill and the plains.

We ſpent the night very ſnug upon beds of fern, with a good fire at the mouth of the cave, and were much leſs troubled with the cold than I expected in ſo bleak a place.

We came down by the Tarare, which, as I have obſerved, is a very ſteep deſcent. You let yourſelf down upon a narrow ridge. On each ſide are precipices, which indeed do not look frightful, becauſe they are covered with trees which conceal them. Halfway down the mountain you find a hot ſpring, that has nothing particular. At laſt we got to our horſes,

horſes, and reached our habitation at the cloſe of night.

Any quantity of brimſtone might be fetched from this mountain, even ſhip-loads. It might be refined upon the ſpot, or made up into lumps to be ſold, and ſhipped in the ore, if it was neceſſary; and ſhould this ſcheme take place, I do not queſtion but the roads might be made eaſier, ſo as to load it upon mules at a hundred paces from the gulph: but it is too cheap a commodity to be worth gathering up in a country, where the price of labour is ſo high from the ſcarcity of hands. Bright yellow brimſtone with a greeniſh caſt might be gathered round the vent-holes of the burning gulph, and likewiſe large quantities of fine natural flowers, or very pure ſulphur. What we call flowers of ſulphur is brimſtone ſublimated, raiſed and fixed into a very fine and ſubtle powder. Theſe chymical flowers harden and cake together, and form a ſolar ſulphur as fine as that, which comes from Peru. It is of a bright gold colour. It is found on the ſides of the burning funnels or vent-holes; and likewiſe upon the ground, at the foot of the great cleft northward, is found a kind of brimſtone reſembling karabe or yellow amber, and altogether as bright and tranſparent, ſo as to be miſtaken for it. Theſe are particles of ſulphur waſhed and purified by the air, rain, and ſun, and I do not think it is poſſible to ſee any thing more beautiful of the kind.

I do not doubt but theſe two ſorts of brimſtone would be as much valued as what comes from Peru; which being mixt with ſalt of tartar, produces that liquor, which is made uſe of to gild metals, and chiefly ſilver.

In

In the ſame funnels you ſee the ſpirit of ſulphur riſe againſt thoſe ſulphureous cryſtalliſations, and drop down like very clear water. The chemiſts agree, that ſulphur is no other than an oily matter fixed by an acid ſpirit. This is evident from artificial ſulphur. By mixing oil of turpentine with ſpirit of vitriol you obtain a ſulphur equal to natural brimſtone. It is farther proved by analyſing it. An acid ſpirit may be extracted from it, and its aſhes afford but a very ſmall quantity of alkaline ſalt. What paſſes in this mountain may be called a natural analyſis and diſtillation. The brimſtone takes fire in the center of the earth, as in chemical operations, when the mixture of ſpirit of nitre and oil of turpentine ſuddenly produces a ſurpriſing heat and flame: in like manner an oily and ſulphureous exhalation inflames and ſends forth fires, which the ignorant vulgar take for ſhooting or falling ſtars.

The flowers riſe with the acid ſpirit, which being condenſed by the cool air, falls down in drops. By fixing bell-glaſſes to the apertures of the funnels, one might collect a ſpirit, that riſes naturally. One of us having thruſt his cane too far into one of the funnels, and not being able to pull it out again, helped himſelf with the blade of his ſword to catch hold of it. In an inſtant we ſaw the hilt quite wet, and the water dropping off, and when he drew it out, we were ſurprized to find the blade extremely hot. We could not then ſave any of this ſpirit, nor make any experiments upon it. However, I do not believe it is like that, which flows from the baths of Wolckeſtein in Germany, which Charles Patin ſays turns to brimſtone when

when expoſed to the air, and is liquid and clear as water under-ground.

I have gone up this mountain ſeveral times to gather ſimples; but as the plants it produces, have already been deſcribed by the Rev. Fathers Plumier and Feuillée, the two minims, who went for that purpoſe upon the mountain called Pelée, in the iſland of Martinico, which is likewiſe a volcano, and produces the ſame plants as the Brimſtone-hill of Guadelupa; I ſhall forbear giving an account of my enquiries in this particular.

LXXXVI. *Account of the Earthquake, felt* February 18, *along the Coaſt of* England, *between* Margate *and* Dover, *in a Letter from Mr.* Samuel Warren, *Superviſor of Exciſe, to* John Windham Bowyer, *Eſq; one of his Majeſty's Commiſſioners of Exciſe. Communicated by* John Pringle, M. D. *F. R. S.*

Honourable Sir,

Read April 1, 1756. PUrſuant to an order from Mr. Noble, bearing date the 11th inſtant, I have made inquiry, as therein directed, relating to a ſhock of an earthquake, which happened on Wedneſday the 18th of February laſt; and find, that at Margate it was felt by Mr. Valentine Jewel and his family juſt before eight o'clock in the morning: they being

being all in their beds, each perſon obſerved their reſpective beds to have a ſudden ſhock, as quick as thought itſelf. Mr. Barber, who lives at the king's-head-inn, and next door to Mr. Jewell, at the ſame time, felt his bed to tremble for the ſpace of half a minute; his wife (who was in child-bed at that time) and her nurſe felt the like trembling in another room, and Mr. Barber's mother (who keeps the ſaid inn) ſaw the door of her room to ſhake, which ſhe thought then to have cauſed by the wind; and in like manner it was felt by many other people in Margate. I cannot find, that it was felt by any perſon in Ramſgate. At Deal, Dr. St. Leger, being in bed on the 18th, a little before eight o'clock in the morning, felt the bed to ſhake under him, which he ſuppoſed to be a ſudden guſt of wind, till he heard other people talk of an earthquake, which they then imagined to be the cauſe of their beds ſhaking.

At Dover, on the above day and hour, five or ſix people felt their beds to ſhake under them; but I can't find they thought any thing of an earthquake 'till they ſaw it in the public papers.

At Sandwich the Rev. Mr. Bunce ſaith, that on the above day and about the ſame hour, he being in bed felt two ſhocks as quick as poſſible one after the other; and he further ſaith, that had he not read the ſeveral accounts of earthquakes abroad, he ſhould not have taken the ſhock to have been of that kind. In like manner it was felt by ſundry perſons in Sandwich. For my own part I felt nothing of it, nor can I hear, that it was felt by any perſon, that was out of bed, ſave at Sandwich, one Mr. Thomas Hayward, who was ſitting in his chair, felt the ſame to

ſhake

ſhake twice; and a maid ſervant of Mr. Jervas Hayward, of this town, being ill, and ſitting in a chair, ſhe felt it ſhake twice. Mrs. Sims and her daughter at Canterbury felt their beds ſhake on the above day and hour. The morning, at that time, was calm, but very hazy; ſoon after we had a very great tempeſt. If any thing further ſhall occur worth notice, I will give your honour an impartial account thereof. I am,

Honourable Sir,

Sandwich, March 25, 1756.

Your moſt dutiful humble ſervant,

Samuel Warren.

LXXXVII. *Remarks on the Stones, in the Country of* Naſſau, *and the Territories of* Treves *and* Colen, *reſembling thoſe of the* Giants-Cauſey, *in* Ireland. *In a Letter to* Thomas Birch, D. D. *Secret. R. S. from Mr.* Abraham Trembly, *F. R. S. Tranſlated from the* French.

SIR, Conduit Street, March 28, 1756.

Read April 1. 1756. BEING in the month of September laſt at Weilbourg in the country of Naſſau, I was informed, that there were found in the neighbourhood a great quantity of ſtones, of a pretty

regular ſhape, and of a conſiderable ſize. I judged from the account, which I had of them, that they reſembled thoſe, which formed, what is called in Ireland, the Giants-cauſey. I was more and more confirmed in this notion, when I ſaw ſome of thoſe ſtones in a pavement. Upon finding, that the quarry, whence they were taken, was at no great diſtance, I went to it the day following. It is in a wood, upon the declivity of a hill. It has not yet been dug into above twenty feet deep, and forty long. I diſtinctly perceived, that this quarry conſiſted of a maſs of ſtones of an almoſt regular form. I examined carefully all thoſe, which preſented themſelves to my view. I cauſed ſome of them to be detached from the reſt; and I ſearched with attention the parts about this quarry. I could not diſcover at what depth theſe ſtones are to be found under-ground. They appear very near the ſurface of the earth, where the quarry, which I am ſpeaking of, lies. And there was a pretty conſiderable ſpace of ground, in which the top of the ſtones appeared, and where it was eaſy to examine the ſhape of their upper ends. It is very far from being the ſame in all of them: but when a great number of them are compared with one another, we find reaſon to conclude, that the hexagonal form is the moſt common. The more regular the figure of theſe extremities is, the more it approaches to that of an hexagon. The two ends of every ſtone appeared to me, for the moſt part, to have the ſame ſhape. The ſides of the ſtone are of the ſame form with the ends, and are plain. Every ſtone is therefore a priſm of a certain number of ſides. They are from three to eight ſides, and of all

all the intermediate numbers. The length of the priſms is not equal. I ſaw none of leſs than two feet long; and I have ſeen ſome of five. The thickneſs of them is not at all more equal: it is of nine inches and under. Many of them form a pillar by lying one upon another. All thoſe, which I ſaw, had their extremities plain, and conſequently were not jointed into the other. They ſeemed to me not at all joined together.

The pillars, formed by ſeveral of thoſe ſtones, are placed exactly one againſt the other, without having any void between them. They are in a ſituation almoſt perpendicular.

Upon breaking theſe ſtones, their colour appears clearly to be black. It is a kind of pretty hard baſaltes. It ſtrikes fire with ſteel; and it appears to be very like that of the Giants Cauſey in Ireland.

This ſtone muſt be very common in the country of Naſſau. I have been aſſured, that ſome leagues diſtant from Weilbourg, there is an old caſtle almoſt intirely built of it.

I went from Weilbourg to Coblentz in the electorate of Treves. I obſerved on the road thither, in the towns and villages, through which I paſſed, that this baſaltes was made uſe of in the buildings and pavements. I made the ſame remark in my journey from Coblentz to Colen thro' Bonne. I found a pretty large heap of it in a village three leagues from Bonne. Theſe ſtones ſeemed to be collected in order to be made uſe of. I met with no perſon, of whom I could inquire, whether there was a quarry in the neighbourhood. In continuing my journey

along the Rhine, in my way to Bonne, I ſaw in the river, the waters being pretty low, a rock, which ſtood a foot or two out of the water. Examining it nearer, I found it to be a maſs of thoſe priſms of baſaltes, the heads of which appeared; and I had all imaginable reaſon to think, that it was the top of a natural maſs of the ſtone. I was convinced by this, that there were quarries of it along the Rhine.

If, in coming near to Bonne, a perſon examines the parapet walls, which are built on both ſides of the high road, he will find them to be of theſe baſaltes ſtones. There are many of them in the old walls of the ramparts of Bonne and Colen, and in the pavements of thoſe cities.

After I had made theſe obſervations, I was informed by Mr. Emanuel Mendez da Coſta, that ſome authors mention quarries of this baſaltes in Upper and Lower Saxony, and in Sileſia. I do not know, that thoſe in the country of Naſſau, and the territories of Treves and Colen, have been deſcribed.

I thought proper, Sir, to communicate to you what little I have learned in a journey, in which I had not time enough to make, upon ſo curious a ſubject, all the reſearches, which I could have wiſhed.

One cannot know too many particulars of this remarkable ſtone, or compare too many of the facts, which they offer to attentive obſervers. This is the true method of attaining, if poſſible, ſome knowledge of this natural curioſity.

Thoſe, who have made obſervations upon ſalts, and inquiries into ſtones, minerals, and metals, know how common cryſtalliſations are in nature. A very great

great variety are found in ſearching mountains, viſiting caverns, and deſcending into mines. There are few of the naturaliſts, accuſtomed to theſe reſearches, who ſhall obſerve the baſaltes above-mentioned, but will be inclined to conſider them as ſo many cryſtalliſations. I do not think, that the great extent of theſe maſſes, which have been diſcovered, and the bigneſs of the ſtones, which compoſe them, form any objection againſt this notion. I am, with very great eſteem,

SIR,

Your moſt humble

and moſt obedient ſervant,

A. Trembley.

LXXXVIII. *An Account of a Work publiſhed in* Italian *by* Vitaliano Donati, M. D. *containing*, An Eſſay towards a Natural Hiſtory of the Adriatic Sea: *By Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* French, *by* Thomas Birch, D. D. *Secret. R. S.*

Read April 1, 1756.

THIS work of Dr. Donati, printed at Venice in 1750, is written in Italian, in the form of a letter addreſſed to Monſignor Leprotti, phyſician to the Pope, dated at Knitz, on the borders of Boſnia, the 2d of November, 1748. This letter contains but a ſmall part of the obſervations

tions, which have been made by Dr. Donati. He has collected them into a much more conſiderable work, in which he had already made a great progreſs. The ſubject is very extenſive, and one of the moſt curious; and certainly requires, in order to its being treated of in a proper manner, all the genius, patience, and reſolution, which diſtinguiſh Dr. Donati to ſo much advantage among the naturaliſts.

The ſea contains a prodigious number of organized bodies, very difficult to be obſerved on account of their ſituation; extremely different, in many reſpects, from the plants and animals of the earth; and which, for that reaſon, muſt neceſſarily diſcover to us new laws in nature.

Dr. Donati has not confined himſelf to theſe objects, tho' ſo numerous and ſo intereſting. The obſervations, which he has made upon a great number of marine foſſils found in the earth, and upon the ſeveral ſoils, in which they are diſcovered, have led him to think, that there muſt be ſome affinity and reſemblance between thoſe parts of the earth, which are actually covered by the waters of the ſea, and thoſe, which are not ſo. This idea, as is eaſily imagined, has opened a vaſt field to his reſearches. He was engaged by it to examine carefully the various ſoils of the countries, which ſurround the Adriatic ſea, and to endeavour to diſcover the different foſſils contained in them. But, what is a ſtill more difficult and newer taſk, he was induced to try to make himſelf maſter of the nature of the ſoils and the foſſils at the bottom of the ſea, in order to be able to compare the one with the other.

Dr. Donati had recourſe to different expedients for obſerving the bottom of the ſea. He took the advantage of calm weather, to view it from his bark to the depth of twelve or fifteen feet, in places where the water is tranſparent. By this means he informed himſelf, what the diſpoſition of the ſoil is under the water to a certain depth, and what the bodies are, which cover it. He then drew up thoſe bodies into his bark, that he might more cloſely examine them. For this purpoſe he contrived the inſtruments deſcribed by him, with which he was enabled to take up from the bottom of the ſea, even to very great depths, marine bodies and maſſes of a conſiderable bulk. In this manner he paſſed through the northern part of the Adriatic Sea, and made uſe of theſe inſtruments for many miles of ground. On the coaſt of Italy he extended his ſearch as far as Ancona; and, on the oppoſite ſhore, he proceeded to the fartheſt parts of Albania, and ſtopped at the gulph of Lodrino.

Theſe coaſts are bordered with a great number of iſlands and rocks; ſome of which lie at a pretty diſtance from the ſhore. Dr. Donati conſidered theſe rocks and iſlands as a continuation of the ſoil at the bottom of the ſea ſurrounding them. The obſervations, made by him on theſe iſlands and rocks, when compared with thoſe, which he made on the bodies taken up from the bottom of the ſea, could not but afford great light with reſpect to the different objects of his inquiries.

He did not reſt here, but examined, with the ſame view, the countries, which ſurround the ſeas above-mentioned. His excurſions to the eaſt of the

Adriatic

Adriatic Sea were very conſiderable, very fatiguing, and very dangerous. His paſſion for natural hiſtory, his particular inclination to botany, and the pleaſure of purſuing his reſearches into countries before unknown to obſervers, made him reſolutely ſurmount thoſe difficulties.

His inquiries have enabled him to determine upon his own knowledge, that there is very little difference between the bottom of the Adriatic Sea and the ſurface of the neigbouring countries. There are at the bottom of the water, mountains, plains, vallies, and caverns, juſt as upon the land. The ſoil conſiſts of diffent ſtrata placed one upon another; and, for the moſt part, parallel and correſpondent to thoſe of the rocks, iſlands, and neighbouring continents. They contain ſtones of different ſorts, minerals, metals, various petrified bodies, pummice-ſtone, lava's, formed by Volcanos.

Iſtria, Morlachia, Dalmatia, Albania, and ſome other adjacent countries, as well as the rocks, the iſlands, and the correſpondent bottom of the Adriatic Sea, conſiſt of a maſs of a whitiſh marble, of an uniform grain, and of almoſt an equal hardneſs. It is that kind of marble called by the Italians *marmo di Rovigno*, and known to the antients by the name of *marmor Tragurienſe*.

This vaſt bed of marble, in many places under both the earth and the ſea, is interrupted by ſeveral other kinds of marble, and covered by a great variety of bodies. There are diſcovered there, for inſtance, gravel, ſand, and earths more or leſs fat.

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The variety of theſe ſoils under the ſea is remarkable. It is to this, that Dr. Donati aſcribes the varieties obſerved with reſpect to the nature and quantity of plants and animals found at the bottom of the ſea. Some places are inhabited by a great number of different ſpecies of plants and animals; in others, only ſome particular ſpecies are found; and laſtly, there are other places, in which neither plants nor animals are to be met with.

Theſe obſervations not only point out to us the affinity and reſemblance between the ſurface of the earth and the bottom of the ſea; but may likewiſe contribute to diſcover to us one cauſe of the varieties, which are obſerved in the diſtribution of the marine foſſils found in the earth.

Dr. Donati remarked in that vaſt maſs of marble, which is common to the bottom of one part of the Adriatic Sea, and to the neighbouring provinces towards the eaſt, a multitude of marine bodies petrified; ſome of which are ſo united to the ſtony ſubſtance, that they are ſcarce to be diſtinguiſhed. He found in ſome places human bones petrified, which form one maſs with a mixture of marble, red earth, and ſtalactites.

One of the objects, which moſt excited the attention of our author, was a cruſt, which he diſcovered under the water in divers places, and for a great extent. It is a compoſition of cruſtaceous and teſtaceous bodies and beds of polypes of different kinds, confuſedly blended with earth, ſand, and gravel.

Theſe different marine bodies, which enter into the compoſition of this cruſt, are found at the depth

of a foot or more, intirely petrified and reduced into marble. At leſs than the depth of a foot they approach nearer to their natural ſtate. And at the ſurface of this cruſt, they are either dead, though extremely well preſerved, or ſtill living.

This obſervation demonſtrates, that ſtones or petrifactions may be formed, and actually are formed, in great quantities under the water.

It is to be remarked, that theſe cruſtaceous and teſtaceous bodies and beds of polypes, mentioned above, are every-where mingled in the utmoſt confuſion with each other: which ſhews a ſtriking reſemblance between the cruſt diſcovered at the bottom of the ſea, and thoſe of the marine bodies petrified, found in many parts under the earth, and eſpecially in Italy. If theſe marine bodies petrified are naturally in that confuſion in the ſea; if they were born and die; and if they have been petrified in that ſtate; it is highly probable, that thoſe, which are found under-ground in the ſtrata in ſuch confuſion, are likewiſe placed naturally in the ſame manner under the ſea, when it covers them, and not by means of extraordinary events, ſuch as volcanos and earthquakes, as has been conjectured.

The more theſe teſtaceous and cruſtaceous bodies and beds of polypes multiply, the more their exuviæ and ſkeletons contribute to inlarge this cruſt diſcovered at the bottom of the ſea. Dr. Donati remarked, that in ſeveral parts it formed very conſiderable banks, and of a very great thickneſs.

It follows from hence, that the bottom of the ſea is conſtantly riſing higher and higher. Divers other cauſes contribute to it. Snow and rain-waters bring down

down from the neigbouring mountains, into the ſea, a great quantity of earth and ſtones. The waves, beating againſt the ſhores of the continent and iſlands, detach many maſſes, which are ſpread upon the bottom of the ſea. The rivers carry the mud with their waters into the ſea, at the bottom of which that mud depoſits itſelf.

From the riſing of the bottom of the ſea, that of the level of the water naturally follows. Dr. Donati furniſhes us with a great number of facts in proof of this. He obſerved, that at Venice, in Iſtria, and in Dalmatia, the level of the waters is ſeveral feet higher than it was formerly. This elevation of the waters is obſerved only on the northern and eaſtern coaſts of the Adriatic. The ſea ſeems, on the contrary, to abandon the weſtern coaſt, that of Italy. This Dr. Donati has ſhewn by many very intereſting facts.

He proceeds then to the obſervations, which he made upon the plants and animals of the Adriatic Sea.

He begins with ſome general reflections upon the nature of both. Upon this occaſion he treats of the queſtion concerning the reſemblance between plants and animals, and in general of the chain, which theſe different organiſed bodies form by the affinity between them eſtabliſhed by nature.

Dr. Donati, in mentioning the facts, which ſhew this imperceptible tranſition from the claſs of animals to that of plants, ſeems inclined to believe, that theſe facts are moſt frequently to be met with in the waters.

After having given a deſcription of ſeveral very curious marine plants, he proceeds to the beds of polypes. He gives this name to all thoſe organiſed bodies, known under the name of coralline bodies; and which were, for a long time, ranged under the claſs of plants. He then mentions different bodies, which he calls plant-animals, and animal-plants, according to the characters, which he found belonging to them, and which bring them more or leſs near to one or other of theſe general claſſes.

It would be too extenſive a deſign to follow our author through all the curious details, which he gives upon this ſubject. Beſides that an extract of that part of his work was read at a meeting of this Royal Society, and is printed in the 47th volume, p. 95. of the *Philoſophical Tranſactions*.

LXXXIX.

Aleph ℵ
Gimel ג
Mem מ
Lamed ל
Ajin ע
Schin vel Sin ש
Jod י

Num. I. *pag. 596 —— 599.*



Ap. Ioan. Swinton, A.M. Oxonienſ. R.S.S.

Num. II. *pag. 594.*



In Gaza Ducis Devonienſ.

Num. III. *pag. 594 & 606.*



In Scrin. Bodleian. Oxon.

Aleph א
Gimel ג
Mem מ
Lamed ל
Ajin ע
Schin vel Sin ש
Jod י

Num. I. *pag.* 596



Ap. Ioan. Swinton, A.M.O.

Num. II. *pag.* 594.



In Gaza Ducis Devonie

Num. III. *pag.* 59



In Scrin. Bodlei

LXXXIX. *A Diſſertation upon a* Parthian *Coin, with Characters on the Reverſe reſembling thoſe of the* Palmyrenes. *In a Letter from the Rev.* John Swinton, M. A. *of* Chriſt-Church, Oxon. *F. R. S. to the Rev.* Thomas Birch, D. D. *Secret. R. S.*

Reverend Sir,

Read April 8, 1756. I Met ſome years ſince with a ſmall braſs medal, in but indifferent conſervation; which I have lately diſcovered, by comparing it with others, to be a Parthian coin. This medal, as I apprehend, exhibits the head of Vologeſes III. adorned with a beard and a tiara, after the Parthian manner, together with a *Beta* behind it, that ſeems to point out to us the place in which it was ſtruck. The reverſe preſents to our view a ſtrange ſort of inſtrument, or machine, which perhaps may be imagined to repreſent a key, beſides ſome traces of characters in a great meaſure defaced, and, if I am not vaſtly miſtaken, four intire Palmyrene letters. As I remember not to have ſeen any of the Palmyrene elements hitherto on antient coins, I hope I ſhall be indulged the liberty of ſubmitting a few curſory remarks upon that now before me, which may be eſteemed a real curioſity, to the conſideration of our moſt learned and illuſtrious Society. Nor ſhall I make any other apology for theſe remarks, however jejune they may appear, than that here hinted at; eſpecially, as the affinity between

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the ſubject of them and thoſe of my former letters, which the Society have done me the honour to publiſh in the laſt volume of the *Philoſophical Tranſactions*, ſeems to render every thing of that kind altogether unneceſſary.

1. That the medal here deſcribed ought to be ranked amongſt the Parthian coins, is abundantly clear from a bare inſpection of the draughts of ſeveral of thoſe (1) coins. And that it was ſtruck in the reign of Vologeſes III. we may conclude at leaſt extremely probable, from two ſimilar Parthian coins, exhibiting the head of the ſame prince. One of theſe, which belongs to His Grace the Duke of Devonſhire, has preſerved on the reverſe the following words, or rather parts of words (2), ... ΒΑCΙΛΕ . . . . . ΑΓΑCΟΥ . . . . ΕΠΙΦΑΝΟΥC . . . . ΙΑΕΛΛΗΝΟC, together with the three Greek numeral letters ΑΞΥ; and the other, now in the poſſeſſion of the Univerſity of Oxford, the very inſtrument, or machine, that occurs on the medal I am here endeavouring to explain, and a legend, conſiſting of ſtrange characters, ſo injured by time as to be rendered thereby abſolutely illegible. The Greek numerals ΑΞΥ indicate the piece, on which they appear, and not improbably that likewiſe now before me, as well as the other in the Bodleian cabinet, to have been coined in the 461ſt year of the Parthian æra, generally term-

(1) J. Foy Vaill. in *Arſacid. Imper.* p. 364, 366. Pariſiis, 1728. *Numiſm. Antiqu. collect. a* Thom. Pembroch. et Montis Gomer. Com. P. 2. T. 76.

(2) Nicol. Fran. Haym Roman. *Del Teſor. Britan.* Vol. Second. p. 37. In Londra, 1720.

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ed the æra of the Arſacidæ, (3) nearly coincident with the 205th of CHRIST, when Septimius Severus ſat upon the imperial throne.

2. With regard to the *Beta* behind the head of Vologeſes III. which is alſo viſible on ſeveral other Parthian coins, I ſhall beg leave to remark, that it cannot well be conſidered as the initial letter of the word ΒΟΛΑΓΑϹΗϹ, or ΒΟΛΑΓΑϹΟϒ, the name of the prince in whoſe reign theſe medals were ſtruck. For that very name originally occurred, as is evident from the part of it which ſtill remains, on the reverſe of the Duke of Devonſhire's coin, with a publication of which the learned world has been obliged by Sig. Haym. It will therefore be readily acknowledged, by all who have been converſant in this branch of literature, that the *Beta* here was intended to repreſent the word ΒΟΛΑΓΑϹΙΑϹ, ΒΟΛΟΓΕϹΙΑϹ, ΒΟΛΑΓΑϹΙΑΔΟϹ, or ΒΟΛΟΓΕϹΙΑΔΟϹ, the name of the city where the piece was coined; at leaſt this muſt be admitted, if we pay any regard to the au-

(3) My ſupputation here is founded upon the moſt received opinion, with regard to the commencement of the Parthian æra; which has been placed by Dr. Vaillant and M. L'Abbé de Longueruë, who are herein generally followed, in the year of Rome 498. It happened, however, about twenty-ſeven years later, according to Sig. Corſini, a gentleman of profound erudition, who at preſent makes a very conſiderable figure in the learned world. J. Foy Vaill. in *Arſacid. Imper.* p. 4. Pariſiis, 1728. Ludovic. Du Four de Longueruë, Ab. S. Joan. de Jardo ad Melod. et Sept. Pont. in Theraſc. in *Annal. Arſacidar.* p. 2, 3. Argentorati, 1732. Edvard. Corſin. Cl. Reg. Scholar. Piar. in Acad. Piſan. Humanior. Litterar. Profeſ. *De Minniſar. aliorumq; Armen. Reg. Num. et Arſacid. Epoch. Diſſertat.* p. 13—29. Liburni, 1754.

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thority of Dr. Vaillant (4), one of the moſt celebrated antiquaries of the laſt age. Nor would it be difficult to produce a (5) ſufficient number of ſimilar initial letters, preſerved on the anterior faces of antient coins, in ſupport of ſuch an opinion.

3. As the imperfect characters, or rather traces of characters, on the reverſe of my medal, have ſuffered ſo greatly from the injuries of time; I ſhall not take upon me to explain, at leaſt with any degree of certainty, the words they originally formed. However, I hope I may be permitted to obſerve, that there appears no (6) inconſiderable reſemblance between the firſt, ſecond, and fifth of them, as it ſhould ſeem, and the *Aleph*, *Gimel*, and *Mem* of the Palmyrenes. As for the confuſed indiſtinct ſort of mark, that follows the ſecond of theſe imperfect elements, it can by no means be conſidered in the light of an alphabetic character, but muſt have been occaſioned by the ravages of time; as the protuberance raiſed by it above the field of the medal, and the remains of the letters near it, manifeſtly proves. If what is here advanced ſhould meet with the approbation of the learned, it may perhaps be allowed, that the two firſt words impreſſed upon the poſterior part of this coin were אגרל מלך, equivalent to the Hebrew המלך הגדול, ΒΑΣΙΛΕΥΣ ΜΕΓΑΣ,

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(4) J. Foy Vaill. ubi ſup. p. 321, 322, 365, 366. et alib.

(5) Vid. Hubertum Goltzium, in *Inſular. Græc. Numiſm.* Tab. vii. Num. 7, 9. et Tab. viii. Num. 4. Wiſe, in *Nummor. Antiquor. Scrin. Bodleian. recondit. Catal.* p. 5. alioſque id genus Scriptor.

(6) *Philoſoph. Tranſact.* Vol. xlviii. p. 693, 740.

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or Ο ΒΑΣΙΛΕΥΣ Ο ΜΕΓΑΣ, THE GREAT KING; which would anſwer with accuracy enough to the words ΒΑΣΙΛΕΩΣ (7) ΜΕΓΑΛΟΥ, exhibited by the reverſes of ſeveral Parthian coins, with complete Greek legends upon them. Should the firſt letter be taken for an *Aleph*, the term to which it belongs would ſeem to be rather of the Arabic (8) than either the Hebrew, Chaldee, or Syriac form. Nor can it be conceived ſtrange, if we ſuppoſe the piece to have been ſtruck at Vologeſia, though the Chaldee or Babylonian dialect muſt have chiefly (9) prevailed there, that this word ſhould favour ſomething of the Arabic form; as this city, according to (10) Stephanus, as well as Ptolemy, was ſeated near the Euphrates, at no great diſtance from

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(7) *De Num. quibuſd. Sam. et Phœn. &c. Diſſert.* p. 53. Oxon. 1750. J. Foy Vaill. ubi ſup. p. 145, 241. & alib.

(8) Val. Schind. *Lex. Pentaglot.* p. 1, 75.

(9) That the inhabitants of Vologeſia enjoyed a flouriſhing and extenſive commerce, when this piece was coined, ſeems to appear, not only from the ſituation of that city, which ſtood at no great diſtance from the confines of Perſia, Arabia, and Meſopotamia, a country limited by the Euphrates on the ſide of Syria, but likewiſe from the tenth of Mr. Dawkins's Greek Palmyrene inſcriptions. It may therefore be preſumed, that Jews, Perſians, or Parthians, Arabs, Syrians, and people of other nations, reſorted thither, in conſiderable numbers, on account of trade. From whence we may conclude, that the vernacular tongue of the Vologeſians was not improbably a mixture of Hebrew, Perſian, or Parthian, Arabic, Chaldee, and Syriac. Hence it might come to paſs, that the two firſt words of this legend were neither pure Hebrew, Arabic, Chaldee, nor Syriac; but received a tincture from moſt, if not every one, of thoſe languages, or dialects. Dawk. *Inſcript. Græc. Palmyren.* Inſcript. x. Chriſt. Cellar. *Geograph. Antiq.* Lib. iii. c. xvi. *Philoſoph. Tranſact.* Vol. xlviii. Tab. xxvii.

(10) Stephanus Byzant. *De Urbib.* Ptol. *Geogr.* Lib. v. c. 20.

the borders of Arabia, particularly that province of it going amongſt the Orientals under the denomination of Najd. The conjectures here laid down, I ſay, upon ſuppoſition that I am not miſtaken in the forms of theſe imperfect characters, may perhaps be conſidered by the learned as not altogether remote from truth. And this is all I deſire, as I would have no greater ſtreſs laid upon them than what they will naturally bear.

4. But though I am not ſo ſanguine in relation to the mutilated letters juſt touched upon, I cannot forbear declaring myſelf ſtrongly inclined to believe, that the four laſt elements on the reverſe of my coin are the very ſame with ſome of thoſe that have been preſerved by the two Roman Palmyrene inſcriptions, and that copied by Mr. Maſſon from Sig. Pietro della Valle's original papers; all which I have, in the laſt volume of the (11) *Philoſophical Tranſactions*, endeavoured to explain. The form of the firſt of them, unleſs I am greatly deceived, anſwers exactly to that of the *Lamed* which occurs in the ſecond of (12) the Roman Palmyrene inſcriptions, and is but little different from that of the ſame element exhibited by the other. The ſecond and fourth of them at (13) leaſt approach extremely near to the figures of the *Ajin* and *Jod*, as they appear in both the Roman Palmyrene inſcriptions. And that the third of them is of a form ſimilar to that of the *Schin*, or *Sin*, preſented to our view by Sig. Pietro della Valle's (14)

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(11) *Philoſoph. Tranſact.* Vol. xlviii. p. 732—757.
(12) *Philoſoph. Tranſact.* Vol. xlviii. Tab. xxx.
(13) Ibid.
(14) Ibid.

inſcription,

inſcription, ſeen afterwards by ſome Engliſh travellers at Teibe, as well as by the ſecond Roman Palmyrene one, will, I perſuade myſelf, ſcarce admit of any doubt. Now that the Greeks ſometimes repreſented *Ajin*, and (15) particularly the Syriac *Ajin*, or *Ae*, by their *Gamma*, is very well known; and that the two powers of the *Ajin*, one of which was equivalent to that of G, are to this day acknowledged by the Arabs, who ſtill expreſs them by their letters *Ain* and *Gain*, the latter of which correſponds with G, is too (16) apparent to ſtand in need of any kind of proof. From whence we may conclude, that the elements I am now conſidering, together with the initial letter defaced by the injuries of time, and the vowels which they virtually contained, probably formed the word BOLOGASHI, BOLOGASI, BOLAGASI, or VOLOGESI, varying only in termination from the Greek ΒΟΛΑΓΑCΟΥ, and the Latin VOLOGESIS; the former of which ſo frequently occurs upon the Parthian coins.

5. That I (17) was a Syriac, Chaldee, or Palmyrene termination of maſculine proper names, ſeems ſufficiently to appear from an inſcription I have attempted to explain in one of (17) my former letters; and that this termination was ſometimes converted into ΗΣ (ES) by the (18) Greeks, has been admitted by Hiller and Bochart, two authors extremely well ver-

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(15) Boch. *Chan.* Lib. II. cap. xii. p. 824. Francofurti ad Moen. 1681.

(16) Vid. Erpen. *Gram. Arab.*

(17) *Philoſoph. Tranſact.* Vol. xlviii. p. 732.

(18) Matth. Hiller. *Onomaſt. Sacr.* p. 671. Tubingæ, 1706. Boch. *Phal.* Lib. II. c. xix. p. 126.

ſed in oriental literature. From whence, without the leaſt violence or torture, we may infer, that the word BOLOGASHI, BOLAGASI, or VOLOGESI, exhibited by the medal before me, the VOLOGESES of Tacitus (19), the ΒΟΥΛΟΓΑΙΣΗΣ of Dio (20), and the ΒΟΛΑΓΑΣΗΣ of the Parthian coins, may be conſidered as one and the ſame name. It muſt alſo be obſerved, that the Words VOLOGESUS and ΟΥΟΛΟΓΑΙΣΟΣ ſometimes occur, as maſculine proper names, in the antient (21) hiſtorians. But that theſe are not ſo conſonant to the true and genuine manner of writing and pronouncing ſuch proper names, may be clearly evinced from the words (22) ARSACES, TIRIDATES, MITHRIDATES, MNASKIRES, PHRAHATES, ORODES, GOTARZES, and others of the ſame kind, that might, with equal facility, be produced.

6. As the two Roman Palmyrene inſcriptions, and that copied by Sig. Pietro della Valle at Teibe, if any regard be due to the preceding remarks, contribute not a little to the illuſtration of my coin; ſo this, in its turn, ſeems, in ſome meaſure at leaſt, to ſupport the authority of thoſe inſcriptions. For as ſeveral of the characters they all exhibit are extremely ſimilar, or rather apparently the ſame; from thence we may collect, that the latter, as well as the former, of them are genuine and valuable remains of antiquity, and have hitherto been deſervedly eſteemed as ſuch by the learned. Nay from thence it will

(21) Tacit. *Hiſt.* Lib. iv. c. 5. Dio, Lib. lxiii. p. 719.
(22) J. Foy Vaill. in *Arſacid. Imper.* paſſ.
(19) Tacit. *Annal.* Lib. xii. p. 338. Pariſiis, 1684.
(20) Dio, Lib. liv. p. 545.

farther

farther follow, that the copies of the three above-mentioned inſcriptions, publiſhed by Mr. Reland and F. Montfaucon, are not very inaccurately taken; and conſequently that the elements they contain, though heretofore termed by me Palmyrene, on account of the reſemblance between them and the letters inſcribed on ſeveral of the ſtones found amongſt the ruins of Tadmor, are not ſtrictly of the ſame form with thoſe that conſtituted, in certain intervals, the true (23) and proper alphabet of the Palmyrenes.

7. In conformity to the ſentiment here laid down, it may be farther obſerved, that the firſt Roman Palmyrene inſcription ſeems to have been drawn in ſome city of Syria, or Irâk, at a conſiderable diſtance from Tadmor, and to have been brought from that city to Rome. This opinion, notwithſtanding what I formerly intimated, or rather (24) inſinuated only, to the contrary, upon farther conſideration of the matter, and ſince the diſcovery of the above-mentioned characters on the reverſe of my Parthian coin, I find myſelf pretty ſtrongly diſpoſed to entertain. Such a notion is not only countenanced by the forms of the letters themſelves, as they were cut in the ſtones, which have preſerved them, about the ſame time that two of Mr. Dawkins's inſcriptions were (25) drawn out at Tadmor, but likewiſe by the word ΠΑΛΜΥΡΗΝΟC, in the correſpondent Greek inſcription. For as all theſe bear nearly the ſame date,

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(23) *Philoſoph. Tranſact.* Vol. xlviii. p. 693.
(24) *Philoſoph. Tranſact.* Vol. xlviii. p. 738, 739.
(25) Ibid. p. 738. Dawk. *Marm. Palmyren.* Inſcript. Palmyren. i, 8. iv, 9.

and

and yet the ducts of the letters they exhibit appear conſiderably different; it muſt be allowed, at leaſt in ſome degree, probable, that they did not originally appertain to the ſame city: and had the monument, on which the local term ΠΑΛΜΥΡΗΝΟC is inſcribed, been firſt erected at Tadmor, that term might perhaps have been deemed by ſome ſuperfluous and unneceſſary, not to ſay improper and abſurd. With regard to the ſecond Roman Palmyrene inſcription, I muſt beg leave likewiſe to remark, that the forms of the elements it contains, which have ſuffered pretty much from the injuries of time, are not preciſely the ſame with thoſe of Mr. Dawkins's letters. From whence I ſhould be induced to conclude, as it is void of a date, that it muſt either have been the produce of a different age; or, which may perhaps be deemed more probable, that the injuries of time have obliged ſeveral of the elements of which it is compoſed to recede ſomething from their original forms. But, notwithſtanding this, that it firſt appeared either at, or in the neighbourhood of, the city of Tadmor, we have all the reaſon in the world to believe. For as Tiberius Claudius, who was a foreigner, dedicated the altar, which it adorned, to *Malachbelus* and the other divinities of Tadmor, who (26) are therein treated as local deities; it had undoubtedly its ſituation at firſt either in that metropolis, or ſome other place in the territories of the Palmyrenes.

8. From the ſame inſcription we may likewiſe infer, that the Calbites, therein-mentioned, performed

(26) *Philoſoph. Tranſact.* Vol. xlviii. p. 756.

a vow they had made to *Malachbelus* and the other gods worſhipped at Tadmor; and conſequently that *Malachbelus* was the principal deity of the people to which they belonged, as well as of the Palmyrenes. This remark will ſhake at leaſt, if it will not intirely overturn, the hypotheſis propoſed to the (27) learned world by Dr. Hyde, viz. that theſe Calbites were a part of the Kelbians, a (28) ſmall inconſiderable canton ſeated at preſent on mount Libanus, and paſſed over in ſilence by the antients; who, according to this author, received the denomination of Kelbians from a black dog that they worſhipped. Nor is this hypotheſis confirmed, or even in the leaſt countenanced, by either Mr. Maundrell, Dr. Shaw, or Dr. Pococke, who lately traverſed that part of Syria where this obſcure and contemptible clan have their habitations. In confirmation of the latter inference here deduced from this inſcription, it appears (29) from the oriental writers, that the tribe of Hamyar, the antient progenitors of the Calbites, chiefly worſhipped the ſun; though they ſeem likewiſe, on certain occaſions, to have paid divine honours to an idol named Naſr. The Calbites alſo, ſettled at Dawmat al Jandal, themſelves adored the heavens, which bear a near relation to the ſun, and might poſſibly have been miſtaken by ſome of the aforeſaid

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(27) Tho. Hyd. *Hiſt. Relig. Veter. Perſar. Append.* p. 491, 492. Oxon. 1700.

(28) D. R. Huntingt. *Epiſt.* p. 47. Lond. 1704.

(29) Al Zamakhſhar. Al Beidawi, Al Jauhar. Al Shahreſtân. Vid. etiam Poc. *Not. in Spec. Hiſt. Arab.* p. 93. 133, 134. & alib. See alſo Sale's *Prelim. Diſc.* p. 17, 19.

writers

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writers

writers for that planet, under the form of a man, and gave them the name of *Wadd*. This notion therefore of Dr. Hyde ought to be exploded as a fiction, advanced without any manner of foundation, and not meriting the attention of the learned.

9. That the four complete characters on the reverſe of my medal vary ſomething from the forms of the correſpondent characters in Mr. Dawkins's Palmyrene inſcriptions, is too obvious and apparent a truth to be denied. However, they may alſo be conſidered as letters of the Chaldee or Babylonian alphabet, with ſufficient propriety, notwithſtanding that variation. Nor can it be deemed matter of ſurprize, that ſuch alphabetic characters ſhould have been impreſſed on the reverſe of this Parthian coin; eſpecially, if it was ſtruck at Vologeſia, as there is undoubtedly room enough to ſuppoſe. For that this city was ſeated in Babylonia near the Euphrates, where the Chaldee or Babylonian alphabet prevailed, is abundantly manifeſt, from what has been already obſerved (30).

10. In ſupport of what has been here advanced, it may be farther remarked, that the Palmyrene letters were not only uſed about the time of Vologeſes III. in the Parthian territories bordering upon the frontiers of Syria, but likewiſe in the interior part of Perſia itſelf. This moſt evidently appears from two inſcriptions, in the Palmyrene language and character, with their correſpondent Greek ones, ſtill preſerved at Noctureſtand, Nocta-Ruſtam, or Naxi-Ruſtan, near thoſe re-

(30) Vid. Steph. Byzant. & Ptol. ubi ſup.

mains

mains of antiquity generally termed *the ruins of Perſepolis*; which have been publiſhed both by (31) Sir John Chardin and Dr. Hyde, as well as in the 17th (32) volume of the *Philoſophical Tranſactions*. The Palmyrene inſcriptions have either been ſo inaccurately taken, or ſo injured by time, that only the two firſt words of them, מרן בר, which in both appear the ſame, are legible. But theſe are ſufficient, with the aſſiſtance of the Greek ones, that have not much better eſcaped, to point out to us both the language and the character in which they were originally drawn. For the Palmyrene terms are equivalent (33) to PERSPICVA SPECIES, CLARA SIMILITVDO, PVRA FIGVRA, THE APPARENT LIKENESS, THE CLEAR RESEMBLANCE, THE TRUE IMAGE, THE REAL MIEN or PORTRAIT; which by the correſpondent Greek words, ΤΟΥΤΟ ΤΟ ΠΡΟCωΠΟΝ, the laſt of which in the firſt inſcription has been miſerably deformed, are, with tolerable juſtice and propriety, expreſſed. The Greek letters, APZA . . . . . CIΛωCBACIΛΕωN, in the firſt inſcription, clearly preſent to our view, in Parthian Greek,

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(31) *Voyages de Monſieur Le Chevalier* Chardin, *en Perſe, &c.* Tome Troiſieme, p. 119. A Amſterdam, 1711. Hyd. *Rel. Vet. Perſ. Hiſt. Append.* p. 518, 519. See alſo *Voyages de Corn.* le Bruyr, Tom. iv. p. 361.

(32) *Philoſoph. Tranſact.* Vol. xvii. n. 201. p. 775, 776.

(33) Val. Schind. *Lex Pentaglot.* p. 238, 983. Edm. Caſt. *Lex. Heptaglot.* p. 422, 2014.

ſuch as ſometimes occurs upon the (34) Parthian coins, the words ΑΡCΑΚΟΥ ΒΑCΙΛΕωC ΒΑCΙΛΕωΝ, *i. e.* ARSACIS REGIS REGUM, OF ARSACES THE KING OF KINGS; and conſequently give us ſufficiently to underſtand, as they are inſcribed on the breaſt of a horſe of ſtone, cut out of the mountain of black marble at Naxi-Ruſtan, or, as others ſay, on the garment of his rider, that they belonged to an equeſtrian ſtatue of one of the Parthian kings. Now the *Omega* of the minuſcular form, always exhibited here, was never viſible on the Parthian coins before the reign of Monneſes, which a little preceded that of Vologeſes III. if the draughts of thoſe coins given us (35) by Dr. Vaillant may be depended upon. Hence we may conclude, that the Palmyrene inſcriptions now before us were probably coeval with Monneſes and Vologeſes III. and conſequently that the Palmyrene alphabetic characters were uſed at Eſtakhr, a very antient and conſiderable city (36) of Fârs, or Perſia properly ſo called, almoſt contiguous to the aforeſaid ruins, that is, in the interior part of Perſia itſelf, about the very time when the piece I am now offering my thoughts upon was coined.

11. From what has been here obſerved, ſome of the learned may perhaps be induced to ſuppoſe, that the aforeſaid ſtupendous remains of antiquity

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(34) J. Foy Vaill. in *Arſacid. Imper.* p. 347.
(35) J. Foy Vaill. *Arſacid. Imper.*
(36) Iſm. Abu'lfed. apud Gol. in *Not. ad Alfragan.* p. 113. ut et ipſe Gol. ibid. Naſsîr Al Tûſi & Ulugh Beik, in *Tabul. Longit. & Latit. Civitat.* Ed. Hudſ. Oxon. 1711.

cannot

cannot ſo properly be deemed the ruins of Perſepolis, as thoſe of another city of a later date. For the above-mentioned inſcriptions ſeem evidently to prove, that thoſe ruins belonged to a very ſuperb and magnificent place, which either ſerved for a reſidence to ſeveral of the lower Parthian kings, or at leaſt was greatly favoured, and on certain remarkable occaſions viſited, by them. Now the antient city of Eſtakhr, which ſome (37) take to be the ſame with Perſepolis, though this cannot be ſtrictly true, as that place is allowed to have been deſtroyed (38) by Alexander the Great, made a conſiderable figure even after the Parthian (39) times, and extended, without doubt, to the ſpot occupied by the aforeſaid ruins, going at preſent under the appellation of Shelmanâr, (40) or Shahelmanâr. Nay Eſtakhr, according to the (41) Perſian hiſtorians, was the capital of Fârs, or, as they call it, Pârs, that is, Perſia, till the royal ſeat was transferred from thence to Al Madâyen upon the Tigris (42), built by Shabûr, ſurnamed Dhu'laktâf, or Sapor III. of the houſe of Saſſan, after the Parthian monarchy was diſſolved; and

(37) Golii *Not. ad Alfragan.* ubi ſup. D'Herbel. *Biblioth. orient.* art. *Eſtekhar*, p. 327.

(38) Plutarch. in *Alexand.* Q. Curt. Lib. v. Arrian. Lib. iii. Diod. Sic. Lib. xvii. Juſtin. Lib. xi.

(39) Gol. & D'Herbel. ubi ſup. Greg. Abu'l Faraj, in *Hiſt. Dynaſt.* p. 183. Mirkhond, apud Teixeir. p. 324. En Amberes, 1610.

(40) Golii *Not. ad Alfragan.* p. 113.

(41) D' Herbel ubi ſup.

(42) Idem ibid.

conſequently it muſt have been, even if we follow them, the principal reſidence of Monneſes and Vologeſes III. as they (43) make the Aſhkanians, Aſhganians, or Arſacidæ, to have formed the preceding dynaſty of the antient Perſian kings. This ſeems to be confirmed, and even rendered inconteſtable, by the inſcriptions juſt touched upon. The authority therefore of thoſe writers, thus ſupported, cannot be impugned by the modern geographers, in the point before us; when they aſſert, perhaps without the leaſt ſhadow of rational proof, that the city of (44) Al Madâyen was in reality no other than the Cteſiphon of the antients.

12. That the ſecond Roman Palmyrene inſcription, whoſe age cannot be determined with any preciſion, is nevertheleſs inferior in point of antiquity to the third of thoſe publiſhed by Mr. Dawkins, the forms of the letters themſelves (45), preſerved on the ſtones that exhibit them, which ſo greatly reſemble the characters appearing on my Parthian coin, ſeem manifeſtly to prove. As the third of Mr. Dawkins's Palmyrene inſcriptions muſt therefore be looked upon as a very valuable acquiſition to the learned world, I ſhall here beg leave to propoſe to the conſideration of the Royal Society a new interpretation of the firſt part of this inſcription; though it be not very different from that

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(43) Khondemir, Al Emîr Yahya Ebn Abd'ollatîf Al Kazwîni, in *Lebtârîkh*, D'Herbel. ubi ſup. p. 135.

(44) D'Herbel. *Biblioth. orient.* art. *Madain*, p. 525.

(45) *Philoſoph. Tranſact.* Vol. xlviii. Tab. xxiv. xxx.

which

which I have already had the honour to ſubmit to the ſuperior judgment of that moſt learned and illuſtrious body. I imagine then, that the mutilated term ברו :: (46) might have been originally either זברו, DEDERUNT, DONAVERUNT, or עברו, PARAVERUNT, DEDICAVERUNT, &c. the latter of which words occurs, in the ſame ſenſe, on a Palmyrene marble, exhibiting an inſcription that I have formerly (47) attempted to explain. If this be admitted, the two firſt lines muſt be tranſlated into Latin (48) thus: DONUM HOC eſt ATQUE ARA QUÆ DEDERUNT (PARAVERUNT, vel DEDICAVERUNT) OMRIBOL SHEMESH (AMRIO'L SHAMS, vel AMRI AL SHAMS) ET ZEBIDA; and into Engliſh thus—: THIS IS THE GIFT AND ALTAR WHICH OMRIBOL SHEMESH (AMRIO'L SHAMS, or AMRI AL SHAMS) AND ZEBIDA GAVE (or DEDICATED.) But whether we adopt theſe new tranſlations, or acquieſce in thoſe formerly given, we cannot, as I apprehend, be very remote from truth; ſince I make not the leaſt doubt, but all of them are perfectly conſonant to the genuine ſenſe and tenor of the inſcription.

13. The term רב, RAB, likewiſe, in the fifth line of Mr. Dawkins's fifth Palmyrene inſcription, may perhaps be ſuppoſed by ſome to admit there of

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(46) Line 3d.
(47) *Philoſoph. Tranſact.* Vol. xlviii. p. 732.
(48) Vid. Val. Schind. *Lex. Pentaglot.* p. 460, 1256. Hanoviæ, 1612.

a fig-

a ſignification, a little different from that which I have aſſigned it, in one of my former letters. It may poſſibly be preſumed to denote AN OFFICER, or MILITARY TRIBUNE, PRÆFECTUS MILITIÆ, vel TRIBUNUS MILITARIS; that being one of the (49) Syriac acceptations of this word. But as the term CTPATIωTHC, or rather CTPATIωTHC ΛΕΓ...., in the correſpondent Greek inſcription, manifeſtly implies, that the perſon who erected the ſtatue, in honour of SEPTIMIUS ÆRANES, was a common ſoldier, or legionary, ſuch as the PILANI were; as this implication ſeems confirmed by the Palmyrene words רדי פלחא, MILES EMERITUS, A VETERAN, or VETERAN SOLDIER; and as the mutilated Greek term ΠΑΤΡωΝ.. apparently denotes this perſon to have been inferior, in point of ſtation, to the ſenator SEPTIMIUS ÆRANES; my former verſions of Mr. Dawkins's fifth Palmyrene inſcription will, I am inclined to flatter myſelf, be allowed to ſtand. However, I ſubmit them, as well as every thing here advanced, with the utmoſt deference, to the determination of the learned.

14. With regard to the laſt mentioned inſcription, I muſt beg leave farther to remark, that the month *Tiſri*, in which it firſt appeared, anſwers to *Hyperberetæus*; which may be conſidered either as a Macedonian or a Syro-Macedonian month. This is clearly deducible from Mr. Dawkins's

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(49) Edm. Caſtel. *Lex. Heptaglot.* p. 3493. Lond. 1669.

ſixth Palmyrene inſcription, and the fragments of the Greek one, with which it did originally correſpond. Hence we may infer, that the Palmyrenes had only one month denominated *Tiſri*; though the Syrians, or Syro-Chaldeans, applied to two of their months that name. This farther points out to us the conformity between the Palmyrenes and the Jews, who likewiſe called only one month *Tiſri*, with reſpect to the names of ſome of their months; which, in two of my former letters, I have already (50) hinted at. As therefore the Jewiſh *Tiſri* and the Macedonian *Hyperberetæus* nearly coincided with the month of *September*, the ſame may perhaps likewiſe be ſaid of the *Tiſri* of the Palmyrenes. Farther, as the æra of Seleucus, according to the beſt (51) chronologers, commenced on the firſt of *October*, our inſcription muſt have been drawn, if the learned ſhould admit what has been ſuggeſted here, in the 252d year of CHRIST; but if, with the Syro-Macedonians, we make *Hyperberetæus* and *October* the ſame month, the preceding year. However, the above-mentioned conformity between the Jews and the Palmyrenes ſeems to render ſomething more probable the former opinion.

15. The Palmyrene letters forming the laſt word of Mr. Dawkins's tenth inſcription may alſo perhaps, at firſt ſight, be imagined to correſpond with the Chaldee or Hebrew elements conſtituting the word

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(50) *Philoſoph. Tranſact.* Vol. xlviii. p. 703, 731.

(51) Gul. Bevereg. *Inſtitut. Chronologicar.* p. 237. Londini, 1721. Prid. *Connect.* Par. I. B. viii. p. 539, 540. Lond. 1720. Jo. Albert. Fabric. *Menolog.* p. 16, 43, 45. Hamburgi, 1712.

בסלו

כסלו, CISLEU, the name of one of the (52) Hebrew months. But, upon a very ſlight examination, it will be found, that ſuch a notion muſt be in ſome meaſure invalidated by the Palmyrene *Lamed*, than which nothing can be more viſible in Mr. Dawkins's copy of this inſcription, at the end of that word. I have therefore ſuppoſed the Palmyrene name of the month here mentioned to have been PELLUL, or PELELUL, an apparent depravation, or corruption, of the correſpondent Greek ΑΠΕΛΛΑΙΩ, the Macedonian name of this month. Nor can I at preſent think any thing, ſince that name anſwers ſo well to the Palmyrene letters, as they appear upon the face of the inſcription, more juſt and natural than ſuch a ſuppoſition.

16. However, as the firſt Palmyrene letter in this word ſeems rather more to reſemble *Caph* than *Pe*, as all the other names of months in the Palmyrene characters are Jewiſh, and as the Macedonian *Apellæus* correſponded with the Jewiſh *Ciſleu*; ſome of the learned may perhaps be thereby induced to believe, that the true lection is CISLEU, notwithſtanding what is intimated to the contrary here. If this be admitted, it muſt be allowed extremely probable, that the laſt letter, which is apparently *Lamed*, was owing either to the inattention of the copier, or the inaccuracy of the inſcriber; or elſe that it was accidentally added to the other elements, after the inſcription firſt appeared. Upon any of which ſuppoſitions, we may read the

(52) Val. Schind. ubi ſup. p. 881.

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Palmyrene word CISLEU; and conſequently aſſert *Apellæus* to have been amongſt the Palmyrenes (53) a Macedonian, not a Syro-Macedonian, month, as the Macedonian *Apellæus* only anſwered to the Jewiſh *Ciſleu*. From whence we may infer, that the other names of months, which occur in the Greek Palmyrene inſcriptions, point out to us Macedonian months; and therefore, that the very learned Cardinal (54) Noris is not to be followed, when he ſeems to declare himſelf in favour of the contrary opinion.

17. Before I diſmiſs the ſubject I am now upon, it may not be improper to obſerve, that the two Palmyrene alphabets, lately diſcovered, will probably enable the learned to decipher various obſcure legends, on the reverſes of Parthian coins, with which the cabinets of the great and the curious are adorned, conſiſting of characters hitherto termed *unknown*, and ſuch as were antiently uſed either at Tadmor, or other places at no vaſt diſtance from that once moſt opulent and flouriſhing city. However, that ſeveral of thoſe coins have preſerved legends drawn up in a character receding ſomething more from that of the Palmyrenes than the letters exhibited by the medal I have been conſidering, there is not the leaſt reaſon to doubt; one of them appearing in my ſmall collection, ſtruck, as I apprehend, in the

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(53) Jo. Albert. Fabric. *Menolog.* p. 16, 42. Hamburgi, 1712. Edvard. Corſin. *Faſt. Attic.* p. 450. Florentiæ, 1747.

(54) F. Hen. Noris Veronenſ. *De Epoch. Syromaced.* p. 124. Lipſiæ, 1696.

reign of Monneſes, never hitherto publiſhed, with ſuch a legend, and a correſpondent Greek one, upon it. Nay this is ſufficiently manifeſt from the Parthian coin now in the Bodleian cabinet, of which I herewith ſend you a draught, that may be intirely depended upon; though the elements it originally bore have been ſo effaced by time, that the powers of them will probably, even by the moſt ſagacious inquirer, never be diſcovered. Nor ſhould I be ſurprized to meet hereafter with medals coined in the principal cities of the Parthian empire, and particularly at Vologeſia, with Greek and Palmyrene letters, as well as Greek and the other ſort of elements, upon them; ſince all ſuch different kinds of alphabetic characters may naturally enough be ſuppoſed to have been uſed in thoſe cities. For that a ſimilar practice prevailed at Tyre and Sidon, where coins were not ſeldom ſtruck, that exhibited both Greek (55) and Phœnician legends, is a point too well known to be controverted amongſtthe learned. And that an intercourſe was kept up, and an extenſive commerce carried on, between the citizens of Tadmor, whether Greeks, Syrians, or Romans, and the inhabitants of Vologeſia, and therefore probably thoſe of all the moſt eminent Parthian towns, is indiſputably clear from one of the Greek Palmyrene inſcriptions (56), which aſſerts this in very ſtrong terms. Other arguments of great weight might be offered, in

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(55) J. Foy Vaill. in *Seleucidar. Imper.* paſſ. Vid. etiam Eraſm. Frœlich, in *Annal. Compendiar. Reg. & Rer. Syr.* paſſ. Viennæ Auſtriæ, 1744.

(56) *Philoſoph. Tranſact.* Vol. xlviii. Tab. xxvii. Inſcript. x.

ſupport of what is here advanced, which the limits of this paper oblige me at preſent to ſuperſede. I ſhall therefore only beg leave to aſſure you that I am, with all due ſentiments of reſpect and eſteem,

Sir,

Your moſt obliged,

and moſt obedient,

humble Servant,

John Swinton.

Chriſt-Church, Oxon.
Novr. 27th, 1755.

XC. *A Catalogue of the* Fifty Plants *from* Chelſea Garden, *preſented to the* Royal Society, *by the worſhipful Company of Apothecaries, for the Year* 1755, *purſuant to the Direction of Sir* Hans Sloane, *Baronet, Med. Reg. & Soc. Reg. nuper Præſes, by* John Wilmer, *M. D. clariſſ. Societatis, Pharmaceut.* Lond. *Socius, Hort.* Chelſ. *Præfectus & Prælector Botan.*

Read April 29, 1756.

1651 ABſinthium maritimum Lavendulæ foliis. C. B. P. 139.

1652 Achillea foliis pinnatis, planis, inciſo-ſerratis, extimis majoribus. Linn. Sp. Plant. 898.

Ptarmica Alpina matricariæ folio Triumf. 83.

1653 Amethyſtea. Hort. Upſal. 9. Amethyſtina montana erecta foliis exiguis digitatis trifidis ſerratis floſculis cum coma e cœruleo ianthinis. Amman. Ruth. 54.

1654 Anonis purpurea verna ſeu præcox, perennis, frutescens, flore rubro amplo. Mor. Hiſt. 2. 170.

Cicer arboreum Indicum perenne. Zanon. 66.

1655 Apocynum Americanum ſcandens, Vincæ pervincæ foliis ſubincanum. Par. Bat.

1656 Aquilegia pumila præcox Canadenſis Cornuti.

1657 Atropa foliis ſinuato-angulatis calycibus clauſis acutangulis. Linn. Sp. Plant. 181.

Alkekengi amplo flore violaceo. Feuillei per 724. T. 16.

1658 Bugloſſum Luſitanicum Echii folio undulato. Tourn. Inſt. R. H. 134.

1659 Bugloſſum Luſitanicum foliis aſperis oblongis, anguſtioribus et criſpis. Inſt. R. H.

1660 Cannacorus flore coccineo ſplendente. Tourn.

Canna Americana flore fulgenti coccineo ſplendente. Hort. Lugd. Bat.

1661 Ceanothus foliis trinervis. Lin. Sp. Plant. 195.

Celaſtrus inermis foliis ovatis, ſerratis, racemis ex ſummis alis longiſſimis. Linn. Hort. Cliff.

1662 Centaurea calycibus ciliatis ſpinoſis foliis bipinnatifidis. Linn. Sp. Plant. 918.

Jacea lutea ſexta. Tabernamontan. Hiſt. 436.

1663 Chelidonium majus, foliis et flore minutiſſime laciniatis. H. R. Par. 49.

1664

1664 Cirſium Acanthoides montanum flore flaveſcente. Tourn.

1665 Clematis cœrulea vel purpurea repens. C. B. P. 300.

1666 Cliffortia foliis dentatis mas. Hort. Cliff. 463. Camphorata Capenſis, Eryngii minoris folio. Petiver Hort. 243.

1667 Cnicus foliis cordatis, petiolis criſpis, ſpinoſis, amplexicaulibus, floribus cernuis. Hort. Upſal. 251. Carduus foliis ex cordato-lanceolatis, margine ſerratis, et ſpinoſis, ſquamis calycum membranaceis laceris ſpinoſis, capitulis nutantibus. Flor. Sibiric. 2. p. 47. Tab. 19.

1668 Convulvulus foliis ſagittatis poſtice truncatis pedunculis bifloris. Flor. Leyd. Prod. 427. Convulvulus Syriacus ſeu Scammoniaca Syriaca. Mor. Hiſt. p. 2. 12.

1669 Cerinthe foliis aſperis tribus vel quaternis ad ĝenicula ſitis. Hiſt. Ox. 3. 24.

1670 Crocus Alpinus autumnalis. C. B. P. 65. Crocus montanus autumnalis. J. B.

1671 Cytiſo-geniſta Luſitanica, magno flore. Tourn.

1672 Cytiſus floribus capitatis, ramis decumbentibus. Fl. Leyd. prod. 376. Cytiſus ſupinus foliis infra et ſiliquis molli lanugine pubeſcentibus. C. B. P. 390.

1673 Cytiſus glaber nigricans. C. B. P. 390. Cytiſus Geſneri, cui flores fere ſpicati. J. B. 1. 370.

1674 Digitalis anguſtifolia flore ferrugineo. C. B. P. 244.

1675

Ptarmica Alpina matricariæ folio Triumf. 83.

1653 Amethyſtea. Hort. Upſal. 9. Amethyſtina montana erecta foliis exiguis digitatis trifidis ſerratis floſculis cum coma e cœruleo ianthinis. Amman. Ruth. 54.

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1674 Digitalis anguſtifolia flore ferrugineo. C. B. P. 244.

1675.

1675 Doria quæ Jacobæa Africana, hederæ terreſtris folio repens. Hort. Amſt. 2. 145.

1676 Ferrum equinum ſiliqua multiplici. C. B. P. 349.

1677 Helxine foliis lanceolatis, caule diffuſo. H. Upſal. 96.

Fagopyrum Orientale ramoſum et multiflorum, perſicariæ folio. Tourn. Cor.

1678 Hieracium caule ramoſo, foliis firmis, infimis petiolatis, reliquis ex ovato-lanceolatis ſemi-amplexicaulibus, omnibus ſinuoſis, petiolorum inſtar dentatis. Fl. Siberic. 2. 26. Tab. 10.

1679 Horminum Verbenæ laciniis anguſtifolium. Triumfett.

1680 Limonium peregrinum foliis Aſplenii. C. B. P. 192.

Statice foliis caulinis decurrentibus. Hort. Cliff. 116.

1681 Lupinus floribus cœruleis inodoris, in ſpicas longas digeſtis, radice reptatrice. Gronov. Flor. Virginic.

1682 Milium Arundinaceum ſubrotundo ſemine, ſorgo nominatum. C. B. P. 26.

Melica ſive ſorghum. Dod. p. 508.

1683 Nicotiana foliis cordatis, floribus paniculatis, tubis clavatis. Linn. Sp. Pl. 180.

Nicotiana folio cordiformi tubo floris prælongo. Feuill. Per. p. 714. Tab. 10.

1684 Nicotiana foliis cordatis, corollis racemoſis ſubringentibus, calycibus inæqualibus. Lin. Sp. Pl. 181.

1685 Oxys bulboſa Æthiopica minor, folio cordato flore

flore ex albido purpuraſcente. Hort. Amſt. 1. 48.

1686 Prunella bracteis pinnato-dentatis ciliatis. Læſl. Deſ. 31.

Bugula odorata Luſitanica. Cornut. Canad. 46.

1687 Quamoclit Americana folio hederæ, flore coccineo. Commelin. Rar. 21.

Convolvulus Americanus folio anguloſo, flore parvo coccineo.

1688 Ranunculus montanus folio gramineo. C. B. P. 180.

Ranunculus pumilus gramineis foliis. J. B. 3. 866.

1689 Ranunculus vernus rotundifolius minor. Tourn. 286.

Chelidonium minus. Offic. Ger. 1669.

1690 Ruſcus anguſtifolius, fructu ſummis ramulis innaſcente. Tourn. 79.

Laurus Alexandrina, ramoſa fructu e ſummitate caulium prodeunte. H. R. Par.

1691 Ruta muraria. C. B. P. 356.

Salvia vitæ. Lobel.

1692 Ruta ſylveſtris minor. C. B. P. 336.

1693 Satureia capitulis terminalibus, foliis lanceolatis. Linn. Sp. Pl. 567.

Satureia Virginiana. Herm. Par. 218.

Clinopodium foliis lanceolatis acuminatis, capitulis terminalibus. Hort. Cliff. 304.

1694 Senecio Madraſpatanus Rapifolio, floribus maximis, cujus radix nonnullis China dicitur. Muſæum Petiver. N°. 680. Hort. Eltham. Tab. 258. fig. 335.

1695

1695 Siliquaſtrum flore purpureo. Caſt. Durant. 415. Arbor Judæ. Dod. 786.

1696 Siſon foliis ternatis. Hort. Cliff. 99. Fl. Virg. 147.
Myrrhis Canadenſis trilobata. Mor. Hiſt. p. 3. 301.

1697 Spartium alterum monoſpermum ſemine reni ſimili. C. B. P. 396.

1698 Tetragonia foliis linearibus. Flor. Leyd.
Tetragonocarpos Africana fruticans, foliis longis et anguſtis. Hort. Amſt. 2. 205.

1699 Tetragonia foliis ovatis. Flor. Leyd.
Tetragonocarpos Africana radice magna, craſſa et carnoſa. Hort. Amſt. 202.

1700 Tithymalus Orientalis, ſalicis folio, caule purpureo, flore magno. T. Cor. 2.

XCI. *Extract of a Letter from Dr.* Vitaliano Donati, *Profeſſor of Botany at* Turin, *to Mr.* Abraham Trembley, *F. R. S. concerning the Earthquakes felt at* Turin, December 9, 1755, *and* March 8, 1756. *Tranſlated from the* Italian.

SIR, Turin, March 20, 1756.

Read April 29, 1756.

THE cauſe of Earthquakes is unknown to me. You know thoſe mentioned by natural philoſophers. It ſeems to me, that they are not ſufficient for explaining all the phænomena. The antients have obſerved, that earthquakes were accompanied with ſome particular meteor,

meteor, and ſome remarkable alteration in the air. Such alterations have been obſerved at the time of the late earthquakes. Who knows, whether an electrical force be not capable of moving above a quarter of our globe? I have communicated this notion to father Beccaria, and I found him almoſt intirely convinced of it.

I did not feel the earthquake of the 1ſt of November laſt. I was then on the road going from Milan to Verceil. There was in the air ſomething harſh, which incommoded me in a particular manner. The wind was ſouth, and not ſtrong. There was no cloud in the ſky; but, from early in the morning to the evening, the air, eſpecially to the ſouth, was, as it were, charged with duſt. About two hours before ſun-ſet, I obſerved the clouds, which formed a band, which extended from the ſouth to the weſt, and even farther. Theſe clouds, at firſt, appeared not very thick, and a little raiſed above the Mountains. After ſun-ſet they appeared very thick, white, and near the ſurface of the earth.

I was informed afterwards, that on the ſame day, about half an hour after eleven in the morning, there was felt at Milan an earthquake. The iron rods, upon which hung the chandeliers of the church of Dome, and thoſe of other churches, received an oſcillatory motion, which they kept for a long time. The waters of canals and lakes roſe above their banks, like the water in veſſels put into motion. No noiſe was heard in the houſes, nor was any ſhock perceived.

This earthquake, of the 1ſt of November, was not felt at Turin. A thermometer of Monſ. de Reaumur was, at ſeven in the morning, at 6 degrees

and a quarter above the freezing point, and at two in the afternoon at 7 degrees. The barometer was at ſeven in the morning at 27 deg. 7 min. and at two in the afternoon at 26 deg. 11 min. and a half. The wind was weſt, and it rained.

On the 9th of December, at half an hour after two in the afternoon, a ſhock of an earthquake was felt here at Turin; but not a conſiderable one, ſo that a great number of perſons did not perceive it. For my own part I felt it very ſenſibly, being then in the Univerſity-pulpit raiſed very high. The chair, on which I ſat, was thrown by the ſhock from one ſide of the pulpit to the other, in the direction of ſouth to north. Upon feeling the motion of the earth, I immediately lifted up my feet, in order that I might the more eaſily be carried with the chair by the motion. This ſhock laſted between 4 and 6 ſeconds. Some minutes after came another ſhock, but it was extremely ſlight. Its direction was likewiſe from ſouth to north. I judged ſo, becauſe the chair, on which I was ſitting, rubbed with ſome noiſe againſt the ſide of the pulpit, againſt which it had been carried by the preceding ſhock. This ſide of the pulpit was towards the north. The ſecond ſhock laſted about two ſeconds. My employments did not permit me that day to obſerve the ſky with attention. I obſerved, that the air was obſcure. The wind was weſt. The barometer at two in the afternoon was at 27 deg. 7 min. and the thermometer at 3 degrees above the freezing point.

I have been informed from Milan, that about the ſame hour, and on the ſame day, a ſhock of an earthquake had been felt. The waters did not riſe, and yet a

good

good deal of motion was taken notice of in thoſe of the lakes. For three days the waters roſe from underground in the lower apartments of the houſes ſituated near the eaſt gate. The ſprings, which water the lands in the country, became more copious.

On the 28th of December at ſix o'clock, according to the Italian way of reckoning, a ſlight earthquake was felt at Padua.

On the 8th of March, at half an hour after eleven in the morning, in the French way of reckoning, as I was reading at my table in an apartment ſituated in the third ſtory very high, as you know, I felt two ſhocks directed from above downwards, but they were very ſlight.

Some time before I had taken the precaution to obſerve in a more ſenſible manner the earthquakes, which might happen.

I had faſtened to an iron bar, fixed in a very thick wall, a braſs wire diſpoſed into a ſpiral line, at the extremity of which hung a leaden bullet of about a pound weight. I made uſe of a ſpiral wire in order that I might the more eaſily remark the leaſt motion, which ſhould happen from above downwards. It hangs near the table, on which I write. When the two ſhocks, which I have mentioned, happened on the 8th of March, I ſaw diſtinctly the leaden bullet at the end of the braſs wire riſe and fall at different times. There was ſix minutes after another ſlight ſhock, which gave the wire an oſcillatory motion from ſouth to north. The wind was then ſouth. The thermometer was in the morning, at half an hour after ſeven, at 5 degrees and a half above the freezing point, and at two in the afternoon at 10 degrees.

The barometer was in the morning at 27 deg. 7 min. and in the afternoon at 27 and a half. The air was a little clouded and ſharp. I was in the evening at Valentin *. I obſerved, that an hour before ſun-ſet, there was a little above the mountains a great band of clouds, which contracted and lengthened themſelves more and more. It began in the ſouth, paſſed through the weſt, and extended almoſt to the north.

I have written to Padua, and Venice, and into Dalmatia and the Eaſt, to be informed what may have been obſerved there. If I ſhall receive any account, I ſhall take care to communicate it to you.

CII. *An Account of a continued Succeſſion of Earthquakes at* Brigue *in* Valais. *Written by the Rector of the College of Jeſuits at* Brigue, *and addreſſed to Monſ.* Jalabert, *Profeſſor of Philoſophy and Mathematics at* Geneva, *and F. R. S. and communicated by Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* Latin.

Read April 29, 1756.

VALAIS, and eſpecially Brigue, have almoſt every ten years felt Earthquakes, but never any ſo conſiderable as in 1755. For in that year, on the 1ſt of November, which was ſo

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* A palace of the king of Sardinia, without the walls of Turin, where the Botanical Garden is.

fatal

fatal to Portugal, we felt Brigue ſeveral times ſhaken, and particularly on that very day. And, what is wonderful, from that time, eſpecially in the night, the walls were perceived by many perſons to tremble; for which reaſon they juſtly apprehended ſtill greater ſhocks of an Earthquake. On the 9th of December, which was a clear day without wind, about two in the afternoon, the earth at firſt made a great noiſe, and ſeemed, as it were, to give a ſignal for immediately retiring. This was, not long after, followed by repeated, but ſlight motions. At a quarter after two, the earth was again ſhaken, and a much louder noiſe heard: at laſt, a little before half an hour after two, all Valais ſeemed upon the point of deſtruction; for the earth began not only to tremble, but to ſend forth a horrible noiſe, and to ſhake all the buildings with ſo violent a motion in the ſpace of two *pater noſters*, that the houſes inclined on each ſide alternately, and rocked like a cradle: almoſt all the chimnies were thrown down; all the churches ſuffered very great damage; the towers gaped; a conſiderable number of walls fell down; and ſtones of all ſizes poured down from all the buildings, ſo that no houſe at Brigue eſcaped ſome injury. It was a ſingular inſtance of the goodneſs of God, that when all the inhabitants fled amidſt the dreadful ſhowers of ſtones falling every where, not one of them was hurt.

The whole neighbourhood ſuffered the ſame calamity, eſpecially Gliſa and Natria. In the latter, the roof of the pariſh church fell at the ſame moment; and at Gliſa, the large church, and eſpecially the tower, were greatly damaged. For a great part of the wall of the tower being removed out of its place,

place, fell on the roof of the church, and broke it, and demoliſhed the ſide altar under it.

At Brigue both the church and college of the Jeſuits ſuffered very conſiderably. Part of the roof of the former fell down; and all the walls of the college were much cracked.

It was likewiſe obſerved by ſome perſons then in the fields, that in ſome places the earth opened and immediately cloſed again; and that water roſe from the ground like a *jet d'eau* ſeveral feet high: which I aſcribe to the ſecret ſprings in the earth. Some fountains likewiſe in the neighbourhood, which had run till then, have ceaſed ever ſince; and, on the other hand, not a few never ſeen before have flowed from that time.

At the diſtance of about an hour's journey from Brigue there is a mountain, where it has been obſerved from the 9th of December to the 26th of February, that every day within the twenty-four hours the ground ſinks in, the ſpace of a thumb's breadth: and every body is perſuaded, that there is water lying there; but the event muſt ſhew, whether any great quantity, or capable of doing miſchief, or only ſome harmleſs ſprings.

With regard to that dreadful 9th of December, almoſt every half hour the ſhocks of the earthquake returned, but without damage; the earth ſeeming to tremble continually under our feet, and as it were to groan. From the 9th of December to the 21ſt the ſhocks were repeated every day, but ſtill fewer and leſs violent. On the 21ſt, at four in the morning, Brigue was ſo much ſhaken, that every body was juſtly frightened: but no damage was done except the falling down of ſome ſtones.

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From the 21ſt to the 27th we felt the earth moved twice or thrice every day at different times. On the 27th, at half an hour after two in the afternoon, Brigue ſuffered a ſhock almoſt equal to that on the 9th, but of a ſhorter duration, and attended with ſcarce any damage. On the 28th, in the morning, about ſix, there were two ſlighter motions. The 29th was the firſt day free from all diſturbance. On the 30th, at one in the night, the houſes were greatly ſhaken, ſo that ſome chimnies, which had been before damaged, now fell. On the 31ſt there was no diſturbance.

On the 2d of January, 1756, at half an hour after nine at night, there was a ſlight ſhock. On the 3d, a little before ten in the morning, there was another gentle one; but none till the 6th, before eight at night, when a pretty conſiderable ſhock happened. On the 7th, about five in the evening, were two more, as alſo on the 8th at half an hour after eight at night. For the three following days all things were quiet. On the 11th, at three in the morning, and again about eight, and on the 12th and 13th, were ſome few ſhocks, but ſlight. On the 14th, at half an hour after two in the morning (which time proved generally fatal) every thing was put into ſuch an agitation, as is inexpreſſible; but the damage was but ſmall, becauſe the motion laſted ſcarce three or four ſeconds. On the 15th, at half an hour after five in the morning, there was a ſlight ſhock. It is obſervable, that on this day, and generally for three or four hours before the earthquake, we obſerved a gentle trembling to precede, and the winds, which were before violent, to ſubſide of a ſudden: and that

the motion ſeemed always to be propagated from the South to the North. It is fact, that all the books in our library, tho' of a ſquare form, were all thrown down from the ſouth towards the north. I obſerved the ſame in the chaſms of the ground, which were near parallel with the meridian. I often remarked likewiſe, that the Rhone grew turbid a little before the earthquakes; and I frequently took notice in the evening after ſun-ſet very long clouds ſtretched out like a ſtrait line, without any breadth, and extended from the South to the North. The earth, in ſome places, was broken into fiſſures, but not large ones.

On the 16th and 17th of January all was quiet. On the 18th, at twelve at night, there was a moderate ſhock, but of a ſhort continuance. On the 19th, at three quarters after twelve, there was another moderate ſhock. The 20th was undiſturbed. On the 21ſt, at eleven in the morning, and the 22d, a little before eleven at night, the earth was ſhaken ſo violently, that every body confeſſed, that this ſhock was very near equal to that of the 9th of December; but the damage done was ſmall. This was ſoon followed by another, but more gentle. On the 23d, in the morning, were two more ſhocks, the firſt ſtronger than the ſecond. On the 24th ſome ſlighter ones: on the 25th more frequent ones, but without much noiſe: the twenty ſixth was as the day preceding, as likewiſe the 27th, except that ſome ſtones fell down here and there. And from that time the motions have grown weaker and leſs frequent, and even none for one or two days. On the 6th of February, at ſix in the morning, there was a very great ſhock; and from that day to the 13th every day a continual

tremor

tremor of the earth, but no ſhock. On the 14th, at night, there was a ſlight motion. On the 15th the earth was twice greatly ſhaken at half an hour after two, and half an hour after five. The 16th was quiet; and the 17th perfectly ſo. On the 18th, at half an hour after one, was a terrible ſhock with a great noiſe, which continued for the ſpace of a *pater noſter*, and ended with a violent ſhaking. On the 19th, at half an hour after eleven in the morning, the walls were again ſo violently ſhaken, that the ſtones, and what was upon the walls, fell down. For ſome days after all was quiet. On the 23d there was a very gentle motion; and on the 26th two, but both ſlight.

I ſhall now ſubjoin the other particulars, which ſeem to me to deſerve to be mentioned.

1. No perſon has loſt his life, tho' many were in manifeſt danger of it. 2. The accounts, which have been publiſhed in the news-papers of Geneva concerning Brigue, are not at all true; for all the churches are ſtanding: and it is falſe, that the earth has opened vaſt chaſms, and that a thick and fetid matter flowed from theſe chaſms. 3. The damage, which the neighbourhood has ſuffered, far exceeds that, which was occaſioned a little before by the inundations. Some of the buildings cannot be inhabited without danger. 4. Whatever is not found in this account may be judged to be falſe. 5. We perceive ſtill ſome ſlight tremor of the earth, but it daily decreaſes. 6. Tho' in the more remote parts of Valais the ſame motions were felt, and at the ſame time, yet the neighbourhood of Brigue was much more ſenſible of them. Brigue is ſurrounded with very high moun-

tains, and ſtands on a hill, Gliſa and Natria, the former of which is at a quarter of an hour's diſtance from Brigue, and the latter at half an hour's, are ſituated almoſt on a plain. Gliſa ſuffered more than Brigue. Laſtly, Brigue never had in any year more violent winds than in 1755; and we are continually infeſted by the ſouth wind.

Theſe are the facts, which I have hitherto remarked with care: if any thing remarkable ſhall occur hereafter, I will not fail to write them to you.

Brigue, 27 Feb. 1756.

CIII. *Extract of a Letter of Monſ.* la Condamine, *F. R. S. to Dr.* Maty, *F. R. S. tranſlated from the* French.

Rome, 11 March, 1756.

Read May 6, 1756.

THE Abbé Barthelemi, who is here, has been at Naples. In the manner of going on with the manuſcripts there, it will require above a century to open and paſt them all. However it is done with great dexterity. But there is only one perſon employed in it. The Canonico Mazzocchi, who copies them, is very capable of that taſk. An academy of Antiquaries is juſt founded at Naples, for explaining all the antiquities dug up at Herculaneum; but according to their method of diſcuſſing things in their aſſemblies, they will not explain two dozen antiquities in a year. They will alter their method, and find, that ſuch kinds of works, and perhaps all others, are not to be done

by a company. The Abbé Barthelemi has read very well a page, except a few words, which he had not time to ſtudy. The account of the manuſcript on muſic is true.

The meaſures of the Abbé de la Caille, and thoſe of Father Maire and Father Boſcovich, whoſe book muſt now be in the hands of the Royal Society, do not agree with the elliptical curve of the meridian, or with the circularity of the parallels. And the earthquakes felt on the ſame day on all the coaſts of Europe, and in Africa and America, at Ancona, Morocco, Boſton, and in the Baltic, may contribute to convince thoſe, who ſhall doubt of it, that the earth has immenſe cavities, and that it is very heterogeneous, or rather of a very unequal denſity. Conſequently its figure is a little irregular; or, if the curvature be ſuch, as the laws of ſtatics ſeem to require in the hypotheſis of homogeneity, that figure muſt be altered by changes happening in the internal parts of the maſs. It was at firſt ſuppoſed to be ſpherical, and the orbits of the planets were conſidered as circular. It was afterwards found, that they were elliptical, and the earth an elliptoid. Every ſtep made in the ſtudy of natural philoſophy has diſcovered ſome apparent irregularity, according to our manner of conception. The refractions, the aberration of light, the nutation of the axis of the earth, have all been reduced to a calculation. Afterwards was found out the irregularity of the refractions upon ſmall eminences, which perplex aſtronomers. The heterogeneity of our globe will puzzle the mathematicians; and earthquakes will perhaps do ſo more than all the reſt. I have probably obſerved to you before, that

I am convinced, that Italy was a chain of volcanos, of which we know only ſome of the links. I have found lavas exactly like that of Veſuvius in the whole way from Florence to Naples, and in places, where there was not any ſuſpicion of volcanos. All the lakes of Italy, which I have ſeen hitherto, exhibit traces, not to ſay evidences, of this.

I begin to think, that the whole earth is perhaps in the ſame caſe with its ſurface, and was thrown into the utmoſt diſorder at ſome period of time, of which no remembrance has been preſerved. Lazzaro Moro, a Venetian, has gone much farther than I do: all the mountains, iſles, and continents aroſe, according to him, from the bottom of the ſea, by means of ſubterraneous fires. I never heard of his opinion till after I had formed my own conjecture, or rather verified the fact in part of the Apennine, which I have paſſed through. I have had time only to run over the titles of his chapters.

CIV. *Obſervations upon the Currents of the Sea, at the* Antiſles *of* America: *By Dr.* Peyſſonnel, *F. R. S.*

Read May 6, 1756. THE coaſts of theſe American iſlands are ſubject to counter-tides, or extraordinary currents, which render it very dangerous to chaloupes and other ſmall craft to land; whilſt, at the ſame time, the boats and ſhips in the roads are ſcarce ever ſenſible of them, and ſeldom incommoded by

by them; nor do thoſe, which are out at ſea, appear to be affected by them. It is however, certain, that a regular wind conſtantly blows, in theſe parts of the of the torrid zone, from the tropic of cancer, to the equinoctial line, from the eaſt; inclining ſometimes northward and ſometimes ſouthward. This wind is called *Alizé, for reaſons admitted by philoſophers, and drives the waters weſtward, giving a total and uniform courſe to that immenſe quantity, which comes from the great river of the Amazons, and from an infinite number of other rivers, which diſcharge themſelves into the ocean. Theſe currents paſſing to the weſtward, go up to the American iſlands, then to the coaſts of Jucatan and Mexico, and running round in the gulph, return into the great ocean, by the ſtraits of Bahama, along the coaſts of Florida, in order to purſue, in the north, the courſe ordained them by the Supreme Being. It is in this courſe the waters are known to run with an extraordinary rapidity; they paſs between the great and little iſlands of America, in the great deeps, by an almoſt even and imperceptible motion; but againſt the ſhores and coaſts of theſe iſlands, which form this archipelago, theſe currents are very ſenſible and dangerous; they interrupt the navigation, inſomuch that it is ſcarce poſſible to ſtem theſe tides to get to the eaſtward. I remember that in 1711, being in the bay of la Guade, a point to the weſt of Portorico, it was impoſſible for us to get up to the town of St. John de Portorico, whither we were conduct-

* Trade Winds.

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ing the biſhop of that town, whom we took on board at the Havanna in the iſland of Cuba: we ſpent thirty days in making thirty leagues; the night was calm, and then we loſt what we had gained by day; and whether we made long or ſhort tacks, the currents drove us to the weſtward. It often happens, that veſſels ſteering from St. Domingo, or the other Leeward Iſlands, to the Windward ones, cannot abſolutely accompliſh it, and are therefore obliged to get out of the channel, and ſteer away to the northward, in order to tack up to the Windward Iſles. Theſe are daily obſervations, and well known to all navigators of America.

Beſides theſe regular currents, there are others, which are called counter-tides, which are obſervable upon the ſea-coaſts and ſhores. In places, where theſe flow, the ſea riſes in an extraordinary manner, becoming very furious without any apparent cauſe, and without being moved by any wind; the waves riſe and open very high, and break againſt the ſhore, with ſuch violence, that it is impoſſible for veſſels to land.

It is obſervable, that theſe ſorts of tides, which ſometimes laſt ſeveral days, and at other times ſpend their violence in twenty-four hours, are more frequent in what they call the bad ſeaſon, which is from the month of July to November, than at any other time of the year: and that, in theſe months, tempeſts and hurricanes happen, which throw down and deſtroy the houſes, buildings and plantations of theſe colonies. I have gone through ſeveral of theſe tempeſts or hurricanes; the firſt in 1712, when I was at ſea, along the coaſt of the iſland of Clerave or Bouriquen, to

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the ſouth eaſt of Portorico; the others in the iſland of Guadaloupe and the Grande Terre. The moſt furious were thoſe, which happened Auguſt 29, 1738, and the 8th of September, 1740, of which I can ſpeak to my own knowledge; and perhaps it may not be diſagreable to hear a deſcription of them, which will lead me to my ſyſtem, or at leaſt to ſupport my conjectures of the cauſe of theſe ſea-currents.

Hurricanes are foreſeen by a calm, and a frequent ſhifting of breezes from all points; the ſetting ſun of a blood-red; little clouds moving with great rapidity; the ſea-birds, called frigates, and many other kinds, quit the air, and ſeek the ſhore. By theſe ſigns, together with the ſeaſon, in which theſe happen, the hurricanes are expected; proper precautions are then taken to avoid the fury of the winds; the houſes are propped, the windows and doors are barred up, and papers and other valuable moveables are ſecured in cheſts.

Soon after, a north breeze ſprings up, which comes to the north-eaſt, and from ſouth to ſouth-eaſt; the air is darkened by one continued thick cloud, which increaſes the horrors of the night; for it often happens, that theſe tempeſts come in the night, and continue all the next day. In the laſt hurricane, I ſaw the wind ſtood at north-eaſt, and blew with ſuch violence, that the largeſt trees were torn up by the roots, their trunks broken to pieces; nor was there a leaf left upon thoſe other trees, which yielded to the fury of the winds; the houſes were thrown down, and the tops of the ſugar-mills, which are conical, and leſs ſuſceptible of being thrown down, were cruſhed

to

to pieces; ſcarce any thing remained ſtanding upon the ground. Theſe furious winds were accompanied with a violent rain, which reſembled the miſt made by the agitation of waves, or like waters kept up by the wind. The tempeſt laſts till day-light, and ſometimes continues pretty far in the day. In that in 1740, towards eight o'clock in the morning, it grew ſuddenly calm for a quarter of an hour, and then returned again blowing from the ſouth, with ſuch violence, that the buildings and trees, which were deſtroyed by the north wind before, were blown about, and moved by the firſt blaſt of that from the ſouth. The hurricanes were followed by ſo many particular and ſurpriſing phænomena, which were almoſt incredible, that I dare not report them: however, a philoſopher, who is acquainted with the force and power of confined air and its elaſticity, might admit them to be true. At the end of theſe, there appears lightening, and we can hear the noiſe of thunder: theſe are the ſigns of the tempeſt's being at an end; for the wind ſoftens gradually, and all becomes quiet.

After theſe hurricanes the foreſts appeared only like a parcel of ſhip-maſts or poles ſtanding; all the trees being ſtript of their leaves, and their branches broken off made a dreadful appearance, eſpecially in theſe countries, where a perpetual verdure adorns the trees and fields. Every one was employed in repairing his loſſes, and mending the diſmal remains of the frightful wreck.

In 1743, two years after the great hurricane, we had a ſtorm leſs violent than the two former. I happened

pened to be from home; and, when the violence of it was over, I turned out to return to my houſe, to repair ſuch loſſes as I expected to have ſuſtained; and, in my road, I came upon a riſing ground from whence I viewed the iſland of Guadaloupe, being then upon the Grande Terre of this iſland.

I obſerved, that the ſtorm, which had affected us in the night, was now very violent upon the iſland of Guadaloupe: it was a frightful, thick, black, cloud, and ſeemed on fire, and gravitating towards the earth: it occupied a ſpace of about five or ſix leagues in front; and above it the air was almoſt clear, there appearing only a kind of miſt.

I then knew, that, in order to be acquainted with the whole force of a hurricane, it muſt be found in the very body of a cloud; that is, we commonly find the effects by the impreſſions made on us, whether by winds, rains, lightening, or thunder, from it. It is from the elements in it theſe effects are produced, where the wind or air is compreſſed, and rolling upon itſelf, cauſes the ſtorms, which overthrow every-thing. He is unhappy, who happens to be in the ſtream of this fluid; for the moſt ſolid buildings tumble down; whilſt the villages of little huts of the negroes ſtand unhurt; becauſe they are not met by the current of wind. Judge what muſt be the violence of theſe hurricanes, when a piece of timber of a mill thirty-two inches ſquare by thirteen feet long, which might weigh eight or ten thouſand pounds, was thrown ſeveral paces from its place by one of theſe hurricanes.

It is in the clouds theſe elements, water, air, and fire, produce their effects. The water is, as it were,

ſuſpended by the wind, and fiery places appear in them, which are neither lightening, *ignis fatuus*, nor *phoſphorus*; nor does the hurricane end, till the cloud burſts, and the lightening and thunder come on; nor do the impreſſions made by the mixture and ſtrife of all theſe elements blended together, ceaſe till then.

This epiſode, far from leading me from my ſubject, which regards the cauſe of currents and counter-tides, is what naturally brings me to it. Theſe clouds, bearing downwards from on high upon the ſurface, form a kind of ſolid, which compreſſes the water perpendicularly, and forces it againſt the bottom. This impulſe, made againſt the ſolid earth below, acts chiefly upon the ſhores according to this motion; then the ſea is ſubject to two impreſſions, one upon the ſurface from the ſtorm that agitates it, and the other from the weight and total preſſure of the cloud that lies over it: this cauſes the waters to circulate at the bottom, giving them a particular motion along the coaſts, which is not perceivable at a certain diſtance from them. According to the direction of the ſtorm, whether eaſt, weſt, north, or ſouth, of an iſland; and according to whatever point of the iſland preſents to the impulſe of the wind, the waters ſeparate, their motion is now in two directions, the current is obſerved to go on one ſide of the iſland to the eaſt, on the other, to the north; and, on the contrary, the one to the weſt, and the other to the ſouth; and that depends upon the poſition of the iſland, according as it reſiſts the total motion of the waters at the bottom of the ſea. Nor have theſe counter-tides any regular or determined courſe.

I ob-

I obſerved, that, whenever we had ſtorms or hurricanes at Guadaloupe, the counter-tides were very violent at Martinico and the neighbouring iſlands; and even in the road of St. Pierre the veſſels, that were moored too near the ſhore, were daſhed to pieces: and in 1750, when the iſland of St. Euſtace was ſo ruined by a dreadful hurricane coming in a contrary courſe, on the 1ſt of November, we had here the moſt violent counter-tides.

This is the deſcription of one of the moſt extraordinary phænomena; and, I think, it is the greateſt counter-tide, that has been heard of On the third of July, 1746, a very ſtrong current, or counter-tide, was obſerved to the windward of this iſland, Grande Terre, Guadaloupe, which came from the iſland of La Deſirade; that is, from the eaſt. It was firſt perceived about the mole; the waves broke in, ſinking ſome of the palliſadoes of the houſes, and tumbling others down; but its greateſt violence appeared about eight leagues from that along the ſteep coaſt; for from the mole, the ſhore is a ſtrait precipice of above two hundred feet high. The ſea was ſo dreadful, that it roſe up, and threw ſand over the precipice upon the plain. I never could have believed it poſſible, if I had not ſeen it myſelf, when I was ſome months after at the Caribbees, which are along this coaſt to the northward of this iſland, Grande Terre, Guadaloupe, in places where the ſea, driven by the common winds, is always in agitation. This coaſt, where the ſavages have a retiring place, is formed by ſuch precipices of two or three hundred feet high, and being ſo plumb ſteep, is a frightful ſight, which way ſoever it is viewed. Above

the precipices the ſea looks like a deep abyſs; the rocks eſcape the ſight below; and, when viewed from below, theſe precipices ſeem to be in the clouds, and their tops over-head look, as if they would fall upon, and cruſh one to pieces every moment. The dread of the earth's failing terrifies thoſe above; and the fear and apprehenſion of the rocks tumbling upon one frights thoſe below; and yet, notwithſtanding all that, the ſavages go aſhore in theſe places, leaving their barks in little creeks, which they find below; and climb theſe precipices, where goats and kids can ſcarce keep their footing; and that with an incredible courage and dexterity.

The place in the Caribbees we went to ſee was agreeable enough, though wild and deſert. We could not ſee from thence La Deſirade, St. Dominique, Guadaloupe, and Les Saints; our view extended over the land of this iſland, which was very low; and the ſea to the northward preſented to us the Engliſh iſlands Montſerrat, Antigua, Nevis, &c. The trade wind refreſhed the air; and ſome trees defended us from the rays of the ſun. It was here we beheld what was almoſt incomprehenſible; and what I never could have believed, if I had not ſeen it. We found a vaſt quantity of ſand thrown up by the ſea from the counter tide, of which I am treating: The ſea was ſo agitated, and was raiſed ſo high, that it paſſed over the bounds, that God had ſet it in this iſland. 1. The waves roſe along this coaſt to two hundred and forty feet high, bringing with them the ſand mentioned. 2. The current continuing its courſe and violence tore away the largeſt trees by the roots along the coaſts, and threw up a prodigious

quantity

quantity of madrepores. In the more low places, towards Port Louis, Pointe d'Antique, it run more than a thouſand paces within land. Here I muſt ſtop, not daring to declare the end of this tide, for fear of being diſbelieved; becauſe I do not myſelf comprehend how what I ſaw could happen, nor imagine the cauſe. What I am to tell you ſhocks good ſenſe and reaſon, although it is the real truth.

It muſt be obſerved, that there is a grand bay or gulph in this place formed by the point called Dantique Iſle Grandterre, and the point of the old fort Iſle Guadaloupe, and by the little iſland called Cahouane; theſe two points are ſeven or eight leagues diſtance from each other; the bay being much of the ſame length, extends inwards as many leagues to the ſalt river, or natural canal of ſea-water, which ſeparates the two iſlands. There are ſeveral ſmall iſlands in the middle of this gulph; and the coaſts all round are very low. Between Lance Bertrand and Port Louis, there is a marſh made by the rain waters, which are confined there by a bank of ſtones and ſand, which ſeparates the lake from the ſea; and the waters of the marſh naturally run towards Port Louis, and partly towards the Pointe d'Antique: ſo that if Port Louis is not lower, it is at leaſt upon the level.

The waters of the counter tide forced this bar or ſand-bank into the marſh, and ruſhed up to the main land, near two thouſand paces from the ſea-ſhore: they muſt have riſen at leaſt ten or twelve feet above the ſurface of the ſea. The natural courſe of theſe waters was therefore to deſcend towards Port Louis; but this was not the caſe: theſe ſame waters, which

were

were ſo violently driven by the counter tide, inſtead of paſſing out by the natural common way, ruſhed back upon themſelves, and returned into the ſea, by the ſame road they had formed for their entrance; and not a drop of theſe waters paſſed to Port Louis. This Pointe d'Antique was always the *ne plus ultra* of the counter tide, as well by ſea as by land. I was at five o'clock that afternoon in the town of Port Louis, and we could perceive no manner of alteration in the ſea. They informed us of the terrible havock made by the counter tide, above the Pointe d'Antique, about a thouſand or fifteen hundred paces from the town. I ran away towards the place, but was ſtopped by the waters, and trees that were torn up, which blocked up the way. The more I conſider this phænomenon upon theſe places, the leſs I underſtand it. The counter tide having finiſhed its courſe, and produced theſe effects, the waters were driven to the iſlands in the middle of the bay, and they were covered with the overflowing waters for ſeveral days. After all this, let mankind endeavour to find a reaſon for theſe effects of nature. Theſe are the obſervations, which, joined to many others, may lead to a general ſyſtem for explaining the currents of the ſea.

Obſervations upon certain Currents in the Mediterranean Sea.

If the knowledge of the flux and reflux of tides is of ſo much importance to navigation, an acquaintance with the currents will appear of no leſs conſequence. There are currents known to be ſo rapid, that

that, notwithſtanding the wind, they are not to be ſtemmed; ſuch as the channel of Bahama in Florida, and ſome others. But there is no certain regulation for thoſe other currents, which happen in the ſtraits along the coaſts, and even at ſea. There are ſcarce any means found out to obſerve them; nor have there as yet been any reſearches made after the cauſes; nor indeed have any applied themſelves to obſerve their exact variations. I do not doubt, but that great advances would be made in the knowledge of the ſubject, if a conſiderable number of obſervations were collected, and compared together; and that the coming of thoſe currents, and even their duration might be foreſeen. The following is what I have obſerved, which I produce in order to be joined to ſuch as may be made hereafter.

Obſervations made at Bizerty, *in* Barbary, *in the year* 1724.

In the voyage I made into Barbary by the king's order, I was at Bizerty, formerly called Hippozaritos: this town is ſituated on the northern coaſt of Barbary, in the kingdom of Tunis, within four leagues weſt of the gulph of Carthage, bearing north and ſouth with Cape Carbonaire in the iſland of Sardinia, and in 37 degrees 18 minutes north latitude.

Before this little town the ſea forms a ſmall gulph, being about a league north and ſouth, by three leagues eaſt and weſt. The town was built at the end of this gulph, upon a canal, which ends in a large pond or lake, which extends ſouthward and weſtward; three leagues long and as many broad. At the end of this

there

there is a ſecond canal, upon which the town called Thimida was formerly built: this canal is about a quarter of a league long, and communicates with a ſecond pond ſomething leſs than the former. I cannot find a reaſon why (according to Monſ. De Liſle, in the chart for the conſideration of the council), this pond ſhould be called Lacus Dulcis; for they both are ſalt water notwithſtanding, and nouriſh a great quantity of ſea-fiſh; ſuch, among others, as the mullet, the roe of which they call, when it is dry, by the name of boutarque *.

I had heard, that there were conſiderable currents in theſe lakes; and when we arrived at Bizerty, I ſaw the waters run out of the lake with ſo extraordinary a rapidity, that I took it for a river: but, upon recollecting what was told me, I obſerved, that the wind was then at E. N. E. that the waters ran out for eight days with this wind; and the lake ſunk a foot and half by the obſervations I made on one of the piers of the bridge upon this canal. The wind then changed, and came about to the weſt, and the water returned with the ſame rapidity that it had run out before. I even perceived on the bank, or fence, made by the reeds, that the waters of the ſea were four inches higher than thoſe of the lake; and roſe while the weſterly wind blew. Some days after the winds ſhifted; and I ſaw on the ſame

* Dr. Shaw (in his travels, pag. 155.) deſcribes the lake of Tunis; and ſays, it is famous for affording a fine proſpect; receiving no ſmall beauty from the many flocks of the Flamant, or Phœnicopterus, that frequent it: and that it is no leſs famous for its large Sweet Mullets; the roe of theſe dried is a delicacy, and called Botargo.

day,

day, the waters paſs in, and out, according as the wind blew eaſt or weſt.

The inhabitants aſſured me, that this phænomenon never happened but ſometimes in winter; and that the rain-water runs out of the lake, when it is full, even though the wind be weſt. Now it may be concluded from theſe obſervations, that the winds contribute very much to the currents of the Mediterranean Sea; ſince they appear to be the efficient cauſe of thoſe I have deſcribed.

Obſervations at Marſeilles.

It is obſerved regularly at the port of Marſeilles, that, when the winds are to the ſouth-weſt, the waters are up; that is, that the waters riſe conſiderably upon the ſhore, and the quay of the port: and that, when they are to the north-weſt, the waters, on the contrary, are very low. This ſecond daily obſervation concurs with the former to prove, that the winds may be the cauſe of the currents.

But as common matters are paſſed over with contempt, frequent obſervations, which may be very quick, are neglected, and people are more ready to attend to what is more ſingular; ſuch as the extraordinary flow, that happened at the port of Marſeilles, on the 29th of June, 1725, when the waters roſe over the quay, and into the ſhops; and as ſuddenly retired. The philoſophers of that place mention it. But I did not ſee it myſelf; but I ſhall deſcribe an inundation very like this, which happened at Bonne in Barbary, which I ſaw, on the fourth of the ſame month, and the ſame year.

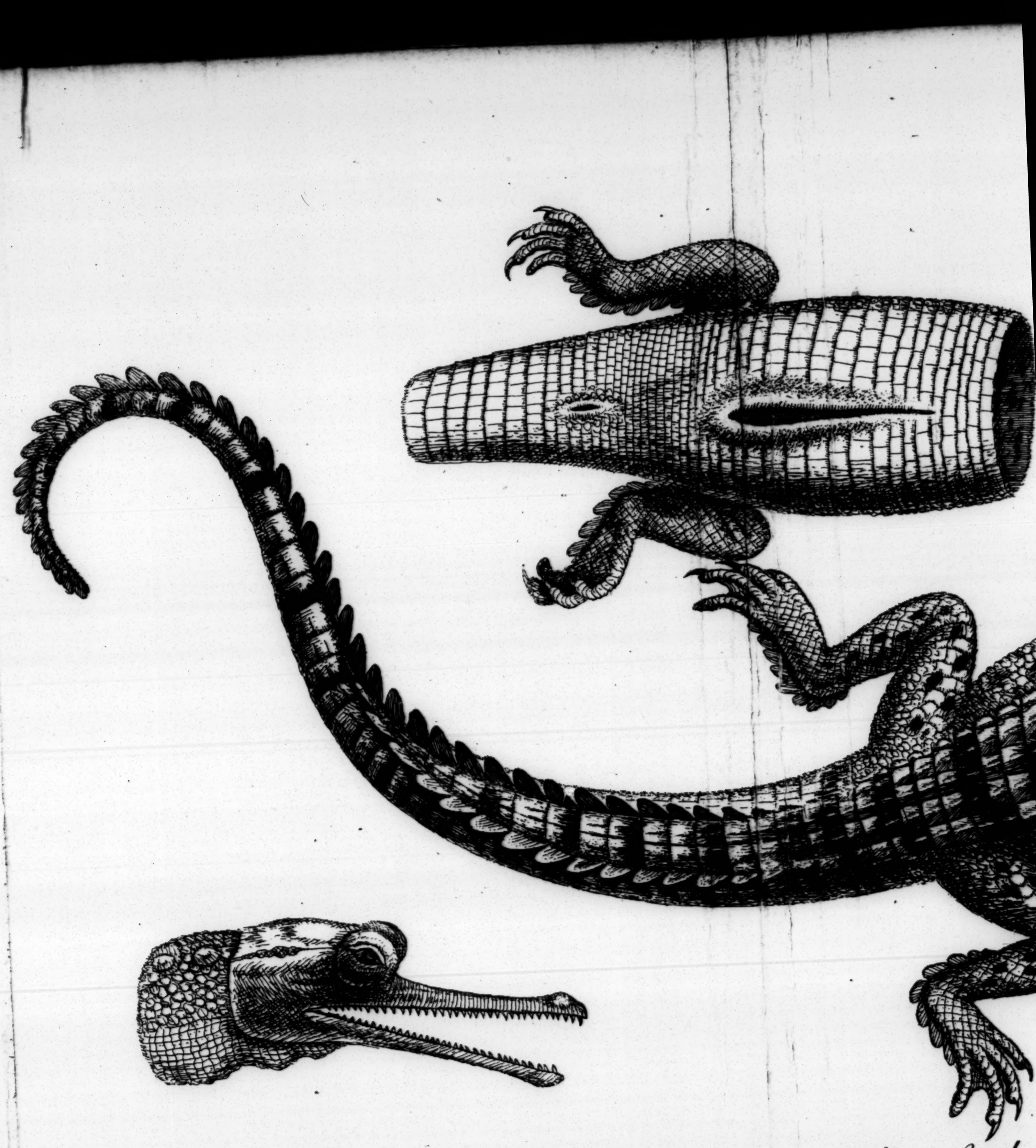
Obſervations at Bonne *(called alſo* Hipone*) in* Barbary.

On that day, the weather was very changeable; it rained in the afternoon; and the wind came to the South-weſt: ateleven o'clock at night it became calm, and the ſea was quiet. I was upon the terras of the India company's houſe half an hour before ſun-ſet; and we obſerved, that the waters were very high; when all on a ſudden an extraordinary current happened; and, in leſs than a minute, the ſea-waters retired ſwiftly, and ſunk ten feet and upwards; the ſea-ſhore became dry more than two hundred paces from its common mark, leaving the fiſh upon dry land, numbers of which were taken up; and among others a kind of raii, which weighed thirty pounds.

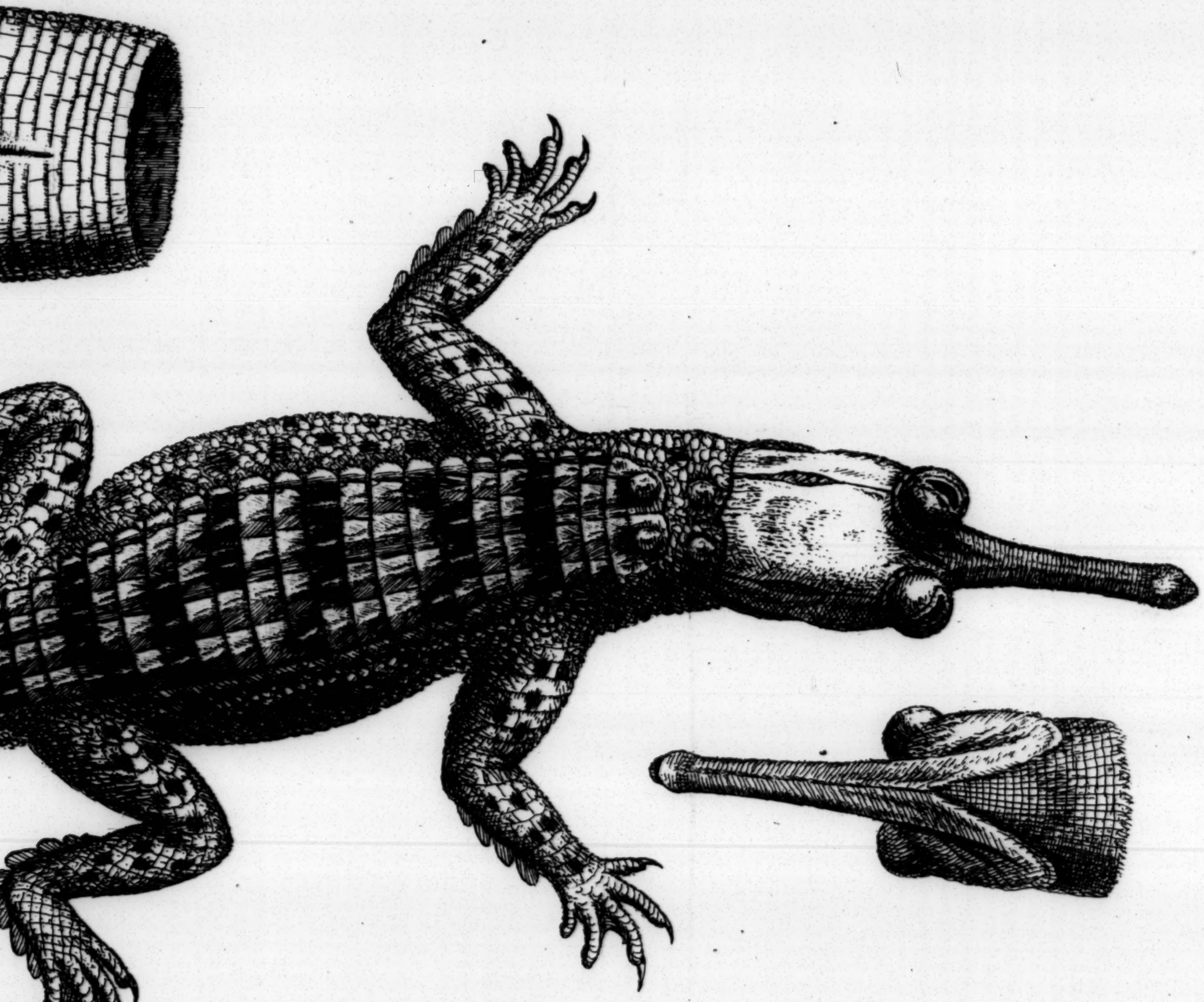
Three minutes after, the waters entered again with the ſame rapidity, with which they ran out; and I obſerved even till night, that thoſe irregular motions of the ſea diminiſhed by degrees; and that, about every two minutes, the waters went in and out alternately, loſing their motion inſenſibly, like thoſe undulations made by agitating a veſſel of water, which gradually become leſs by turns.

My reflections upon theſe obſervations would be unneceſſary. I ſhould however add here, what the coral-fiſhers told me, and made me obſerve, on holding the cord of the machine, which they caſt into the ſea for fiſhing. They obſerve, that there are often currents upon the water, which carry their boats to one ſide; whilſt at the bottom of the ſea, there is a contrary current to that upon the ſurface; and that, if they are not expert in making proper remarks, they often

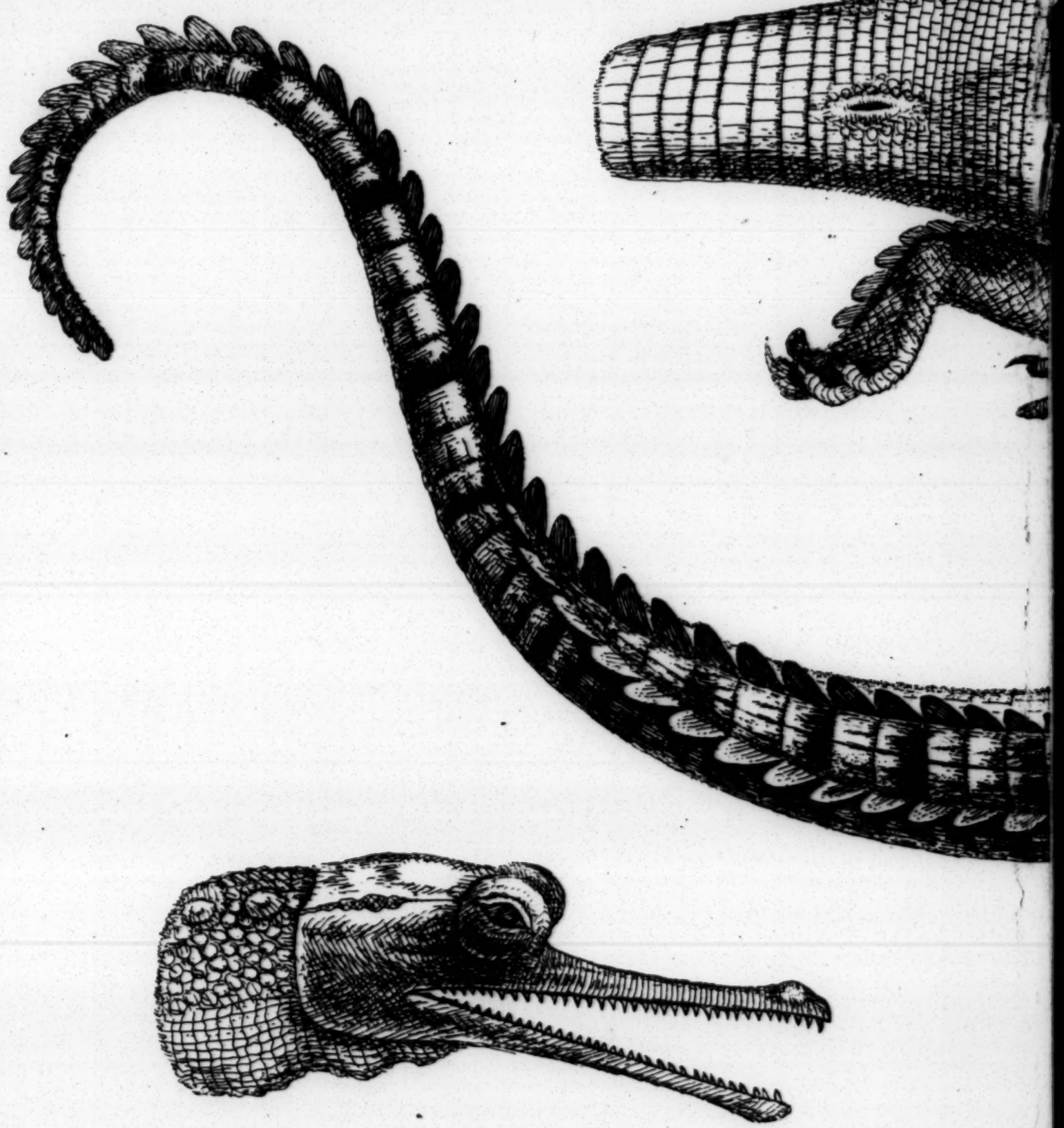
loſe



The narrow Beak'd Crocodile of the



of the Ganges, with an Open-belly. *Geo. Edwards Delin. et Sculp. A. D. 1756.*



The narrow Beak'd Cr

loſe their fiſhing; caſting their nets to little purpoſe, which being carried away by the current, do not fall where they intend for finding the coral.

XCV. *An Account of* Lacerta (Crocodilus) ventre marſupio donato, faucibus Merganſeris roſtrum æmulantibus. *By Mr.* George Edwards, *Librarian to the College of Phyſicians.*

Read May 6, 1756. THREE of theſe Crocodiles were ſent over from Bengal about ten years ago to the late Dr. Mead, phyſician in ordinary to the King; two of which he preſerved in his own collection, and preſented the third to the late curious Mrs. Kennon; and ſince the deceaſe of theſe eminently worthy perſons, they are all become the property of Mr. James Leman, of London, who has obliged me with the uſe of one of them to produce, together with this account, to the inſpection of the Royal Society; which is the ſubject here laid before you; and of which I preſent the Society with a figure, juſt of the ſize and form it appeared in, when taken out of the ſpirits (Tab. xxix.). I ſuppoſe this not to have been many days excluded from it egg, when taken. My reaſon for this conjecture is, becauſe the nails or claws on the outer toes do not yet appear; which, I ſuppoſe, may be inconvenient, or at leaſt uſeleſs, while it is incloſed in the egg; which, by its ſtruggles, might tear its membranous covering before

the proper time of its excluſion. A young allegator or crocodile from North America, here laid before you by way of compariſon, has part of its nails wanting on its toes, juſt as the above deſcribed wants them; though in a large dried allegator, now in the college of phyſicians, all the toes are armed with ſtrong claws. What is moſt extraordinary in this ſpecies, and diſtinguiſhes it from all other crocodiles, is the narrowneſs of the beak or chaps, which appears like the bill of the bird, which we call a gooſander (merganſer). It has ſmall ſharp teeth, of which I ſhall ſay no more, as I have given three very exact views of the head and beak. Another particularity is a pouch or open purſe in the middle of the under ſide of the belly, which ſeems to be naturally formed, with round lips and a hollow within, perhaps to receive its young in times of danger; as we find it in an American animal call an opoſſum. As I have no pretenſions to the knowledge of anatomy, I aſked the favour of my obliging and curious friend Dr. Parſons, of the Royal Society, to aſſiſt me, who, according to my requeſt examined it, and gave it as his opinion, that the opening in the belly was really natural, it having no appearance of having been cut or torn open. In other reſpects it hath all the marks common to allegators and crocodiles; viz. a particular ſtrong ſquare ſcalineſs on the back, which in the young ones appear diſtinct and regular, but in the older ones loſe their diſtinct form, and become knobbed and rough, like the bark of an old tree; and in having ſmall, round, and oval ſcales on their ſides, which in the young ones are no bigger than

rape

rape ſeeds; and the belly is ſcaled, to appearance, a little like the laying of bricks in a building. It has fins on the out-ſides of its fore and hinder legs, as other crocodiles have. It has alſo a great diſtinguiſhing mark of the crocodile kind, viz. two rows of fins on the upperſide of the tail, which begin inſenſibly ſmall at the ſetting on of the tail, and increaſe gradually as they advance toward the middle of the tail, where they become one row, and ſo continue to the end; the tail is roundiſh at its beginning, but from the middle, where the two rows of fins become one, it is flat like an oar. The four feet have each of them five toes; the hinder feet have only four, which is alſo a mark of the crocodile; all the leſſer lizards, that I have obſerved, having five toes on each of their hinder feet. In the fore and hinder feet, the third and fourth toes only are webbed together. The eyes are very prominent, and ſeem to be contrived, that they may be carried above the water, while the reſt of the animal is wholly under water, in order, as I ſuppoſe to watch its prey on the ſurface of the water, or on the banks and ſhores of rivers. The head is covered with ſeveral large ſcales. The beak is finely creaſed tranſverſely, as the ingraving in the figure ſheweth. As I have been very exact in my figure, which was worked on the copper plate immediately from nature by my own hand, and in ſeveral different views, it will expreſs more than can eaſily be conveyed by words. It appeared in the ſpirits all over of a yellowiſh olive colour, the underſide lighter than the upper; the upper ſide having ſome duſky marks and ſpots, as repreſented in the print. I do not know, that this ſpecies hath yet been

been figured or taken notice of by any author; which is to me a wonder, ſince our India Company have been ſo long ſettled at Bengal: and this I have reaſon to believe, when at full growth, to be near, if not quite, as big as the common crocodile.

College of Phyſicians,
London, May 6, 1756.

XCVI. *An Account of an unuſual Agitation of the Sea, at* Ildfarcombe, *in* Devonſhire, Feb. 27, 1756. *By the Rev. Mr.* Prince, *of* Barnſtable: *Communicated by the Rev.* Jeremiah Milles, *D.D. F.R.S.*

Read May 13, 1756.

ON Friday, the 27th day of February laſt, at ſix in the evening, the weather being then extremely fair, as it had been for ſome time before, and continued for ſome days afterwards, the ſea being exceedingly calm, a rumbling noiſe was heard, like that, which uſually precedes what the ſailors call a ground-ſea, only it was much louder. The tide, at that time, was above half ebbed, and retired as far as the head of the key, leaving the veſſels, within the pier, on dry ground: when on a ſudden the ſea came on with a great run, filling the quay to the height of ſix feet perpendicular; and the water remained at the ſame height near half an hour, but was all the time agitated as in aſtorm. By this means all the veſſels were afloat; ſome broke looſe from their moorings, and on the receſs of the waters were likely to be carried out to ſea. The conſternation, which this occaſioned, gave

no

no leiſure for accurate obſervation, nor could any one inform me of the exact diſtance from the time of the firſt ſwell till the waters roſe to the height of ſix feet, ſome ſpeaking of four, others of five or or ſix minutes.

It is to be obſerved, that the like phænomenon happened on the 1ſt of November laſt, and the waters then roſe to the ſame perpendicular height.

XCVII. *Extract of a Letter from the Rev. Mr.* Holdſworth, *at* Dartmouth, *relating to the Agitation of the Waters obſerved there on the 1ſt of* November, 1755. *Communicated by the Rev.* Jeremiah Milles, *D. D. F. R. S.*

Read May 13, 1756.

I Have enquired particularly of our pilot-men, and others concerning the tides in this harbour, who unanimouſly, agree that there was a ſurprizing agitation in the waters about nine in the morning on the firſt day of November laſt, when there was a great and ſudden ſwell; and though there was but little wind, yet the boats, riding near the mouth of the river, tumbled and toſſed as if they would have leaped into each other; and two of them broke looſe from their moorings. During this fermentation (or boiling of the ſea like a pot, as my informant expreſſes himſelf) though it was four hours ebb, the waters roſe as high, or higher than they uſually do on the higheſt ſpring tide. This

violent

violent motion laſted about three quarters of an hour, and then the waters fell to their uſual height at that time of the tide, and have continued to flow and ebb ever ſince without any perceivable alteration. I am,

Reverend Sir,

Dartmouth, April 30, 1756.

Your moſt obedient ſervant,

Henry Holdſworth.

It appears by this account, that the agitation of the waters obſerved at Ilfarcombe, on the 27th of February laſt, was not perceived on the ſouthern coaſt of Devonſhire.

XCVIII. *An Account of a Method of obſerving the wonderful Configurations of the ſmalleſt ſhining Particles of Snow, with ſeveral Figures of them: By* John Nettis, *Doctor of Phyſic, and Oculiſt to the Republic of* Middleburg, *&c. Tranſlated from the* Latin.

Read May 13, 1756. I Had a mind to examine what kind of figured particles icy concretions conſiſted of. I found an icy ſtar of ſix rays, with long ſtriæ joined to them on every ſide, (which having, together with the rays, angles of ſixty degrees, were wonderfully adorned on both ſides with other long particles) in the midſt of a large veſſel of rain water:

water: but my endeavours were fruſtrated by the water, which adhering to the little ſtar, as I took it up, was inſtantly frozen, and turned its figure, that was ſo exactly formed, to a cruſt.

And, as by comparing the icy ſtars, in the ſurface of the ſtanding water, with thoſe of ſnow, it ſeemed to me very likely, that the minute parts of ice had the ſame external configurations with thoſe of ſnow, when the air was coldeſt, I prepared in the year 1740, to make the moſt minute obſervations, and the moſt exact drawings in my power of the moſt perfect figures of ſnow, which were not very irregular, the weather being then very favourable for the purpoſe.

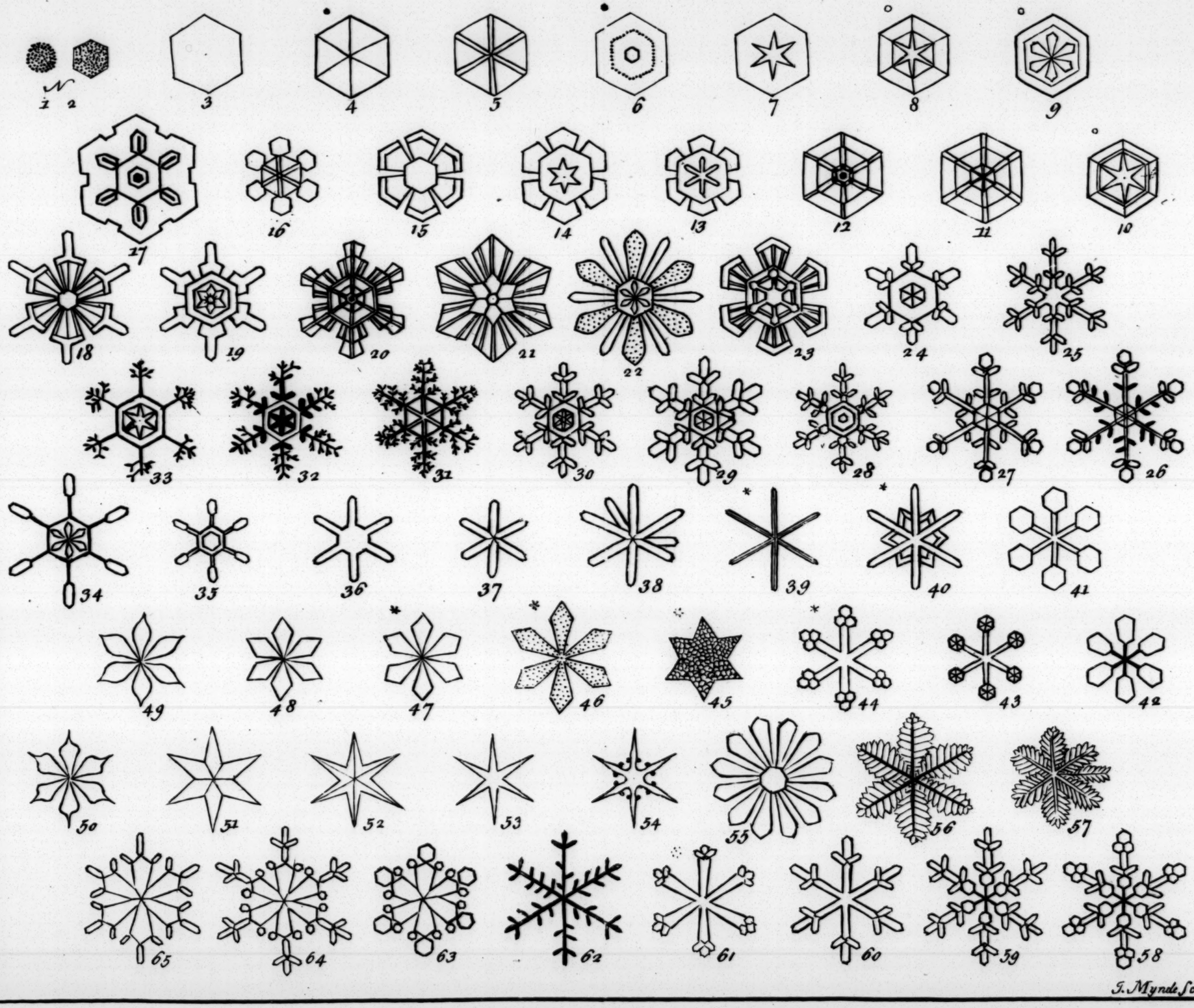
I firſt made uſe of double convex glaſs lenſes of about an inch focus; then I uſed a compound microſcope conſiſting of an object, and an eye glaſs, or two eye glaſſes, invented and carried to England by Corn. Drebellius, an ingenious philoſopher, as Huygens, in his Dioptrics, and others aſſert; and brought to greater perfection by the induſtrious Engliſh, by the addition of a concave ſpeculum, placed under the object glaſs, in order to reflect a better light, and render the object more conſpicuous.

The weather being intenſely cold, the ſnow, which fell, was hard, intire, and pellucid, and ſome particles being received upon a pencil, were placed upon a plane glaſs plate under the object glaſs: the greateſt care was taken, that the ſmalleſt particles might not be diſſolved, either by the breath, or perſpiration of the hands, leſt the little angles might, by the leaſt degree of warmth, diſappear. And thus, with this apparatus and theſe precautions, the extreme ex-

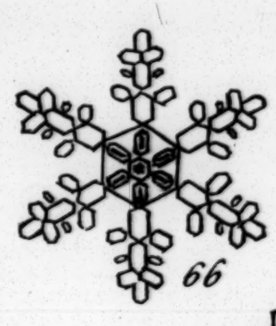
actneſs and equality of the figures of their moſt minute particles might be obſerved and delineated.

Some conſiſted of long round ſpiculæ; others approached to a round figure made up of ſmall globules; but theſe were obſerved to be opake, as the air was diſpoſed to thaw; but when the air was frofty, many ſlender hexangular figures appeared, ſome of equal, others of unequal ſides; ſuch as are exhibited by Scheuchzer in his *Herbarium diluvianum*, and by Swedenburg in his *Prodromus principiorum*, p. 21; and ſuch as I have ſeen in a pitcher, which was covered, in which the water was frozen; and ſuch figures of the concretions of vitriol, ſalts, &c. as may be ſeen in the works of Leewenhoek, whom I find to be the moſt faithful and expert in delineating and deſcribing the minuteſt natural bodies; and alſo ſuch as are publiſhed by Capellar in his *Prodromus Cryſtallographiæ*.

Several little ſtars ſeemed to me to conſiſt of ſix oblong, round, hexangular lamellæ, or indeed of ſix rays terminating in points; which little ſtars appeared to be formed of ſix plane rhomboidal particles. Several plane hexangular particles of equal ſides, or oblong hexangulars, adhered to ſeveral of theſe ſtars, either at their extremities, or at each ſide of every ray. Some hexangular lamellæ of equal ſides were adorned all round with ſix other lamellæ of the ſame figure and ſize, or with hexangular oblong lamellæ, and to theſe ſometimes there adhered ſeveral others more or leſs. Many of theſe hexangulars were ornamented with ſix rays, and to theſe were fixed the moſt ſlender lamellæ, which were alſo hexangular, of equal or unequal ſides; but of equal angles of ſixty

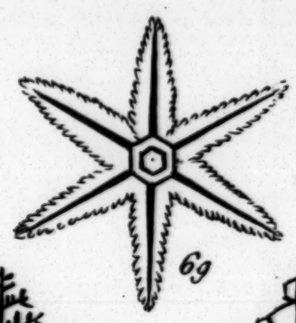

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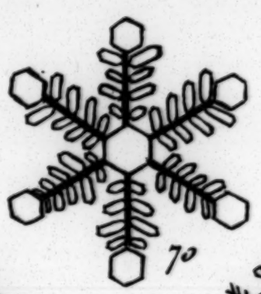
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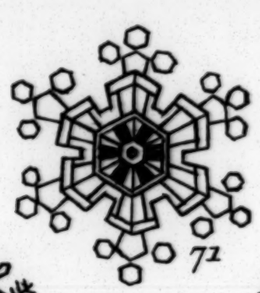

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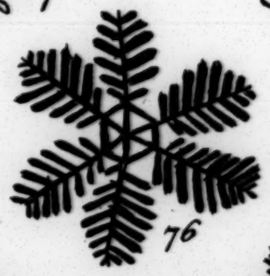

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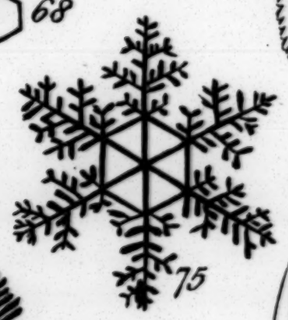

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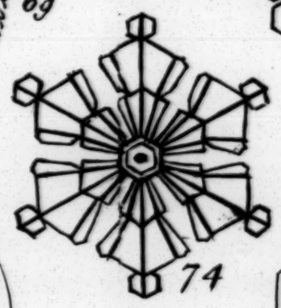

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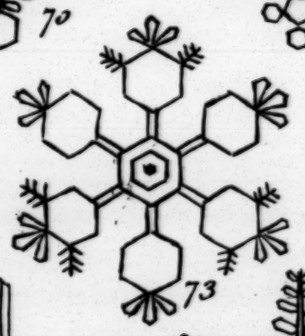

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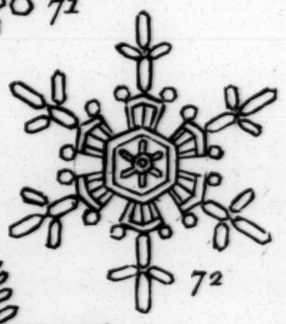

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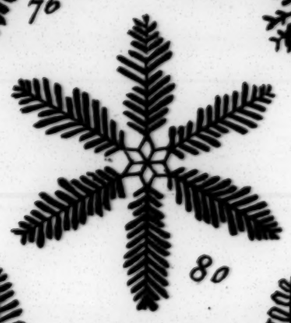

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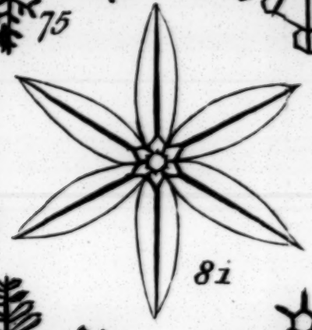

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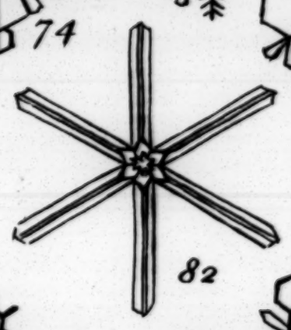

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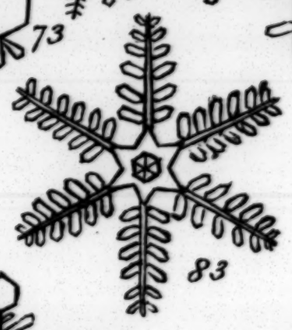

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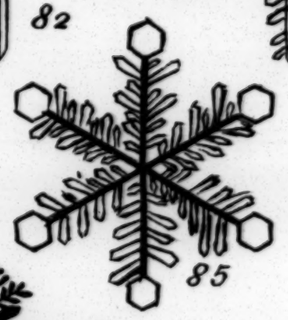

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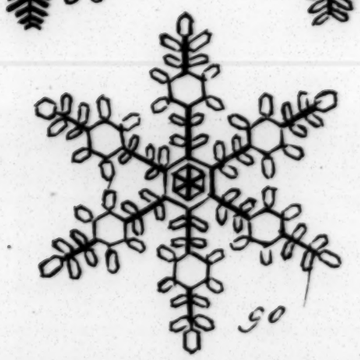

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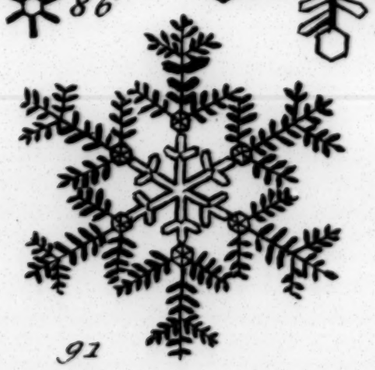

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degrees; and to theſe lamellæ others like them adhered, ſome greater and ſome leſs, but moſt of the latter; and others various like the fortifications of cities appeared to be joined to long hexangular ſpiculæ, and plane hexangles of equal ſides.

In one day and night I found fifteen, twenty or more particles of ſnow differently formed; ſuch as Olaus Magnus mentions; and in the year 1740, on the 11th, 12th, 13th, 21ſt, and 23d of January, and alſo on the 6th, 23d, and 24th of February, I had an opportunity of delineating eighty different admirable figures of ſnow, and of obſerving their numberleſs varieties.

And although a vaſt variety of theſe configurations of ſnow may fail or vaniſh in the ſame moment, yet the ſmaller particles, from their various combination with one another, conſtituting this wonderful variety of configurations of the ſnow, were obſerved by me to be comprehended under theſe following forms, viz. of parallelograms, or oblong, ſtrait, or oblique quadrangles, rhombs, rhomboids, trapezia, or of hexangular forms of equal or unequal ſides, whoſe angles are ſixty degrees; and theſe hexangular particles were far more numerous than thoſe of any other form mentioned.

The natural ſize of moſt of the ſhining quadrangular particles, and of the little ſtars of ſnow, as well the ſimple as the leſs compound ones, does not exceed the twentieth part of an inch: nor do the more compound particles the fifth of an inch. For the natural magnitude or rather ſmallneſs, ſee fig. 4. 6. 8. 9. 10. 35. 37. 39. 40. 44. to 47. and 61.

Theſe beautiful various configurations to the number of 91, are in Tab. xx. and xxi.

N. B. Number 57 and 84, are anomalous figures of ſnow; of which there is an infinite variety, that may be obſerved.

XCIX. *An Account of the Copper-ſprings lately diſcovered in* Pennſylvania: *By* John Rutty, *M. D. of* Dublin. *Communicated by Mr.* Peter Collinſon, *F. R. S.*

Read May 20, 1756. IN the province of Pennſylvania is a copper-mine, which affords a ſpring, that appears to have the ſame qualities as that Iriſh water, lately deſcribed by Dr. William Henry and Dr. Bond in the 47th and 48th volumes of the *Philoſophical Tranſactions*, but is much ſharper, for it will diſſolve iron in a quarter part of the time; and we are aſſured, by the accounts tranſmitted from the proprietors of it of the trials they have made, that it yields the ſame copper-mud or duſt as our Cronebaun-water, of the county of Wicklow, in this kingdom (being the water above mentioned) which being collected from bars of iron immerſed in it, for the purpoſe of extracting the copper from the Pennſylvania water, it produced above half pure copper on being melted in a crucible; an experiment, that requires to be repeated, in order to aſcertain the proportion of copper contained with accuracy; our copper-ſpring of the county of Wicklow yielding a proportion conſiderably larger than this, viz. 16 parts of copper out of 20 of the mud.

In the neighbourhood is a great abundance of the ores of vitriol and ſulphur, and the ſpring comes

thro'

thro' an immenſe body of vitriol-ore, and the ſupply of water is very large, 700 or 800 Hogſheads flowing in 24 hours.

The water is of a pale-green colour, of an acid, ſweet, auſtere, inky and nauſeous taſte.

It is very ponderous, and inſtantly betrays the great ſtrength of the metallic impregnation by the hydrometer; which, immerſed in this water, preſently mounted above the ball, and ſtood in it nearly at the ſame hight as in a ſolution of one ounce and ſix drams of Engliſh vitriol in a quart of water.

A little of the ſolution of pot-aſhes inſtantly precipitates the metallic parts of this water in grains of three different colours, viz. ochre-coloured at the top, green in the middle, and white at the bottom: and the appearances with ſpirit of hartſhorn were much alike, except that the grumes at the bottom participated of a mixture of a blue colour with the white, indicating more clearly the mixture of Copper.

But iron immerſed, above all other things, renders the contained copper conſpicuous to the eye; for a clean knife, kept in it a few minutes, is covered with a bright copper-colour; and needles and nails kept immerſed in it a month in a phial were covered with a ruſt, partly yellow and ſhining, which ſeems to be the copper, and partly a ferrugineous matter, as appeared by the magnet: and that it was partly cupreous appeared by the bright blue tincture extracted by ſpirit of hartſhorn from ſuch parts of the ruſt, as did not readily fly to the magnet; and, if one might rely on the Philadelphia experiment above-mentioned, the proportion of copper ſhould be very large.

It

It is however certain, that, as in other copper-ſprings, ſo in this, here is a very conſiderable proportion of the vitriol of iron combined with it, and by all experiments a much greater than of the vitriol of copper; and accordingly, galls added to this water turned it firſt blue (the characteriſtic of martial vitriol) and then of a dilute ink-colour; and the corks in the bottles were blackened.

But the genuine quality, as well as large proportion, of the impregnating ſalt, will further appear by the following analyſis of this water, viz. A pint of it, exhaled by a ſlow fire, left 400 grains of ſolid contents, which were partly green and partly ochre-coloured, with an intermixture of bluiſh, and of a rough, ſweetiſh taſte, like that of ſal martis, and appeared to be chiefly ſaline, not leaving above four grains of indiſſoluble matter on diſſolving 196 grains of it, and filtring.

Thus it appears, that the proportion of vitriolic parts in this water is very large, viz. above ſix drams to a pint or 3200 grains to a gallon; and conſequently it is a ſtronger ſolution of vitriol than ſea-water is of marine ſalt; and, moreover, is truly conſiderably the ſtrongeſt of all the vitriolic waters, that have yet occurred to my obſervation; for our Cronebaun water, in the county of Wicklow, gives but 256 grains from a gallon; Haigh in Lancaſhire, (the ſtrongeſt in Britain, that I know of) 1920 grains; Shadwell 1320; Kilbrew, in the county of Meath, 1530 from the the ſame quantity; ſo that beſides the copper to be obtained by immerſing bars of iron, as in our county of Wicklow water, this water offers to its proprietors another peculiar advantage, viz. an oppor-

opportunity of erecting a copperas-work or manufacture of vitriol, like the Hungarian vitriol; eſpecially the vaſt ſupply of water and plenty of fuel in the place conſidered.

The great ſtrength of the vitriolic impregnation further appears from hence, that a little of this water, laid by in a cloſet in a porringer, did, by the mere effluvia, without any fire, form large cruſts of green vitriol on the brims and outſide of the veſſel; which vitriol, although it appears both by the colour, taſte, and the tincture ariſing from the mixture of a ſolution of it with galls, to be of the ferrugineous kind, yet plainly ſhews, that it partakes of a conſiderable proportion of copper by imparting the copper-colour, when moiſtened and rubbed on the blade of a knife, and moreover the indiſſoluble parts of the ſediment of this water left in the filtre on diſſolving it, exhibited a bright blue colour on being rubbed, and laid by with ſpirit of hartſhorn; an appearance peculiar to copper.

This water, though juſtly ſuſpected to be poiſonous, if taken in its native ſtrength, yet being lowered with common water it is frequently uſed for purging and vomiting the country people, and is uſeful in curing ulcers, and cutaneous diſorders, and particularly for ſore eyes.

Dublin, 22d, 4th month, April,
1756.

C. *Extract of a Letter from the Abbé* Mazeas, *F. R. S. concerning an ancient Method of Painting, revived by Count* Caylus. *Tranſlated from the* French *by* James Parſons, *M. D. F. R. S.*

Paris, Nov. 17, 1755.

Read May 27, 1756. I AM to inform you of a diſcovery made here this year, which my long illneſs hindered me from communicating ſooner.

The Count de Caylus, a member of the Academy of Inſcriptions, had undertaken to explain an obſcure paſſage in Pliny the Naturaliſt. This author (whom I have not now before me) ſays in ſome place of his works, that "the ancients painted with burnt "wax;" and we have it from tradition, that pictures of this kind were very durable.

This was the paſſage, that the count undertook to clear up, in trying all the different ways, that are poſſible, to paint in wax; and after many experiments, he hit upon a very ſimple method, of which he made a ſecret, in order to excite the curioſity of the public. For that time, he only thought proper to ſhew one picture at the Louvre, repreſenting the head of Minerva, painted in the manner of the ancients; and it was much admired. I ſaw it, and ſhall inform you by and by what effect it had upon me; but let us firſt return to ſpeak of the public.

The ſeveral artiſts, who were deſirous of knowing by what means the count came to make this diſcovery, made ſeveral attempts themſelves; but in a great number of trials, only two are worth mentioning.

The

The firſt was to melt wax and oil of turpentine together, and uſe it for mixing the colours. But this method does not at all explain Pliny's meaning, becauſe wax is not burnt in this way of managing it: and beſides, this method has two defects; the oil of turpentine dries too faſt, and does not allow the painter ſufficient time to blend and unite his colours.

The ſecond method is very ingenious, and ſeems to come up to Pliny's notion very well: it is as follows: The wax is melted with ſtrong lixivium of ſalt of tartar, and with this the colours are ground. When the picture is finiſhed, it is gradually put to the fire, which increaſes the heat by degrees; the wax melts, ſwells, and is bloated up upon the picture: then the picture is removed gradually from the fire, and the colours do not at all appear to have been diſordered: the colours then become unalterable by the action of the air, and even ſpirit of wine has been burnt upon them without doing them the leaſt harm.

However, the following is the count de Caylus's method, which is much more ſimple; according to which the head of Minerva was painted, which was ſo much admired by all the Connoiſſeurs.

1ſt, The cloth or wood deſigned for the picture is waxed over, by only rubbing it ſimply with a piece of bees-wax.

2dly, The colours are mixed up with common water; but as theſe colours will not adhere to the wax, the whole picture is to be firſt rubbed over with the Spaniſh *chalk, and then the colours are uſed.

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* Spaniſh white.

3dly, When the picture is dry, it is put near the fire, whereby the wax melts, and abſorbs all the colours.

It muſt be allowed, that nothing can be more ſimple than this method; and it is thought, that this kind of painting is capable of withſtanding the injuries of the weather, and laſts longer than paintings in oil; which I will not anſwer for.

The effect produced by theſe colours upon wax is very ſingular; nor can one have any notion of it without ſeeing it. The colours have not that natural varniſh or ſhining that they acquire with oil; but you are capable of ſeeing the picture in any light, or in whatſoever ſituation you place it: in ſhort there can be no falſe glare or light upon the picture for the ſpectators: the colours are ſecured, are firm, and will bear waſhing; and have a property, which I look upon as the moſt important of any, which is, that they have ſmoaked this picture in places ſubject to foul vapours, and to ſmoke in chimnies; and then by being expoſed to the dew, it became as clean, as if it had been but juſt painted.

This, Sir, is all that regards the new *encauſtic* painting or painting in burnt wax: it comes from the word *encauſtum*, which is all that remains about it: for the ancients have commonly left us the names of their diſcoveries, without any account of them.

CI. *Obſervations on the* Abbé Mazeas's *Letter on the Count* de Caylus's *Method of imitating the antient Painting in burnt Wax: By* James Parſons, *M. D. F. R. S.*

Read July 1, 1756. THE ſubject of the Abbé Mazeas's letter, concerning what he thinks the encauſtic painting in burnt wax, is very difficult to underſtand; for although the count de Caylus has made an eſſay to find out the method of the antients in that kind of painting, his ſucceſs, in the head of Minerva, mentioned in the Abbé's letter, does not ſeem to explain Pliny's meaning. This author is ſo very ſhort, and obſcure in moſt things, that a bare literal tranſlation of ſome parts of his work would hardly be reconcileable to ſenſe; and this is no where more evident than in this very ſubject.

I confeſs I do not pretend to underſtand what he means by painting in burnt wax, though I have conſidered it over and over, ſince my having tranſlated the above letter. However, it may not be unentertaining to the Society, to hear a few paſſages of Pliny taken notice of upon the matter, by which, perhaps, ſome of the worthy members of this learned body may enter farther into it.

The two principal methods tried at Paris were theſe; the Count's was waxing over the cloth or board, mixing up the colours with water, and rubbing the waxed ground over with Spaniſh chalk, in order to make the colours adhere to the waxed ground. The other was by mixing other ingredients with the wax

and colours and laying it on. In both theſe methods the picture is moved to the fire gradually, in order to liquify the wax, and blend and unite the colours, and then moved from it by as ſlow degrees. This cannot be called burning in wax, nor be counted encauſtic painting; unleſs *uro*, or the Greek καιω, could ſignify to liquify as well as to burn, in which ſenſe I never met them any where. And if theſe words mean only to burn, then encauſtic painting can ſignify no more nor leſs than painting in enamel; in which wax, from its very nature, can have no ſhare. And yet at the end of the 11th chapter of his 35th book, he ſeems to give *uro* another meaning: he is admiring the wonderful effects produced in dying ſtuffs, which being firſt ſcowered, are laid over with ſome colourleſs material, in whatever pattern they chooſe; and upon being dipped in a caldron of boiling liquor, the ſtuffs appeared to be finely and variouſly painted; "Cortina pingit dum coquit; et aduſtæ "veſtes firmiores ſunt, quam ſi non urerentur." Here *uro* muſt ſignify to boil; for we cannot ſay the burnt ſtuffs were become ſtronger, than if they had not been burnt.

In the ſame book he has theſe words:

"Encauſto pingendi duo fuiſſe antiquitus genera "conſtat, cera et in ebore, ceſtro id eſt viriculo; "donec claſſes pingi cœpere. Hoc tertium acceſſit, "reſolutis igni ceris penicillo utendi: quæ pictura "navibus nec ſole, nec ſale ventiſque corrumpi-"tur."—

The cloſe tranſlation of this ſeems to be as follows:

"It appears, that anciently there were two kinds "of encauſtic painting, in wax, and in ivory, with a

"ſtilus;

" ſtilus; until ſhips began to be painted: then this " third kind came up of uſing a bruſh or pencil, with " wax melted by fire, &c." Now tho' Pliny uſes the word *pingendi* in the two firſt, we cannot underſtand that he could mean the laying on of paint, ſince the inſtrument (the ceſtrum) being pointed, is incapable of ſuch an office; and ſecondly, becauſe he immediately mentions a third kind of painting diſtinct from, and an abſolute contraſt to the other two, wherein the paint with the melted wax was laid on with a bruſh; and this contraſt is very ſtrong in another paſſage in the ſame chapter, where he ſpeaks of a famous virgin called Lala, of whom he ſays, " Romæ et peni- " cillo pinxit, et ceſtro in ebore, imagines mulierum " maxume." That is ſhe painted at Rome with a pencil, and with the ceſtrum or ſtilus upon ivory, chiefly the images or portraits of women.

We cannot help thinking, that what was done with the ceſtrum, either upon the wax or ivory, was modelling or carving; for the modellers of this day, in their compoſitions of wax and other materials, uſe pointed tools to repair and render their figures ſharp; and the workers in ivory uſe ſuch tools of various points and edges for the ſame purpoſe.

It will not be amiſs in this place to take notice of the ſenſe, in which Monſ. Durand puts this paſſage, of which he makes a very looſe tranſlation in his hiſtory of antient painting: viz. " Il faut que j'indique ici " en peu des mots ce que c'eſt que cette peinture " en cire, que l'on perfectionne avec le feu: pour " cela il faut ſçavoir, qu' anciennement il y en avoit " de deux ſortes; dans la premiere, on employoit la " cire preparée en divers coleurs, qu'on appliquot

" en

" enſuite ſur le bois, ſuivant l'eſquiſſe qu'on y avoit
" tracée, ou creuſée avec un fer chaud; dans la ſe-
" conde on gravoit de meme dans l'yvoir, avec un fer
" aigu et ardant les contours et generalement l'idée de
" tout de ſujet, apres quoi on appliquot les couleurs
" pour les Ombres, en laiſtant l'yvoire pour les jours,
" et perfectionnant le tout enſemble par le moyen
" du feu, comme on le pratiquoit auſſi pour le
" bois."

Now it is very eaſy to ſee, that Pliny's words are very different from any thing in this tranſlation; and that this may be more plain, I here give a cloſe tranſlation of Mr. Durand's words: viz. " I muſt
" ſhew here what this painting in wax is, which was
" finiſhed by fire. It muſt therefore be remarked,
" that in antient times there were of two kinds of
" this painting; in the firſt they uſed wax pre-
" pared in divers colours, which they then put
" upon the wood, according to the deſign they had
" traced out with a hot iron. In the ſecond, they
" engraved in the ſame manner upon the ivory, with
" a ſharp burning iron, the contour, and generally
" the idea of the whole ſubject, after which they ap-
" plied the colours for the ſhades, leaving the ivory
" for the lights, and finiſhing the whole by the
" means of fire, as they alſo practiſed it upon
" wood."

Monſ. Durand has gathered theſe notions from *Pere Hard.* and *Boulenger de pictura veterum*; which are no more applicable to Pliny, than they are practicable in themſelves; Pliny has no ſuch meaning, for his words are very clear, as I have ſhewn it before: but he takes the ſame liberty in that paſſage of the fe-

male

male painter, Lala, juſt mentioned, upon whom the words of Pliny are very preciſe; "Romæ et penicillo "pinxit, et ceſtro in ebore:" which Monſ. Durand has rendered thus: "elle peignot a Rome, ou ſur le bois, "ou ſur l'yvoire, comme on vouloit, ou avec le pin-"ceau, ou avec de cire colorée." "She painted "at Rome either upon wood or upon ivory, as ſhe "thought proper, either with a pencil, or with co-"loured wax." Now Pliny has not one word of wood or coloured wax in this paſſage; nor could he mean any other, than that ſhe ſometimes painted with a pencil, and ſometimes carved in ivory.

I am therefore inclined to think, that when Pliny mentions *cera* in the ſingular number, altho' he ſays *pingere*, yet as the *ceſtrum* is mentioned with it, it muſt be underſtood to mean carving or modelling; but that when it is in the plural, as in the following cited paſſage, and of burning the picture, he muſt mean the true encauſtic or enamel painting, and the *ceris* muſt mean a compoſition, which was capable of enduring the fire; for which, perhaps, the following ſhort reaſons may have ſome weight.

It appears in the 2d chapter of his 35th book, where Pliny is ſpeaking of the *Honos imaginum*, that modelling was greatly practiſed, eſpecially the buſts of great men, and of very ancient ſtanding. Theſe were made during the lives of the perſons, and laid up in their armories, or other repoſitories, till their deaths, in order to be carried before the deceaſed in their funeral rites, and expoſed to the public, while an oration was made by the neareſt of kin, who pointed to the image, as he proceeded, in his Elogium upon the virtues of the perſon repreſented: and

this

this image was modelled in wax, as our wax-work is made to this day, and painted in natural colours, in order to come the nearer to nature. Pliny's words are very clear in this; " expreſſi cera voltus ſingulis " diſponebantur armariis, ut eſſent imagines, quæ co- " mitterentur gentilitia funera, &c." And it is alſo evident, that in order to take the true reſemblance of the perſons, whoſe buſts they intended to make for theſe purpoſes, they took off a plaiſter maſk from the face, and by way of mould, caſt melted wax into it; whereby they obtained every feature, and afterwards made it perfect by repairing with proper tools. This is fully declared in his 12th chapter of the ſame book, which treats of plaſtics: wherein after he has mentioned Dibutades a potter of Sicyon to be the firſt inventor of forming the likeneſs of things in clay or plaſter, and of firſt making images upon the corners of his tiles, he gives the invention of taking off maſks from the face, for making buſts, to Liſiſtratus, of the ſame town, brother of Lyſippus, in theſe words :—

" Hominis autem imaginem gypſo e facie ipſa " primus omnium, expreſſit, ceraque in eam for- " mam gypſi infuſa, emendare inſtituit Liſiſtratus " Sicyonius, frater Lyſſippi; hic et ſimilitudinem " reddere inſtituit.—crevitque res in tantum, ut nulla " ſigna ſtatuævé ſine argilla fierent; quo adparet " antiquiorem hanc fuiſſe ſcientiam, quam fundendi " æris." In a word, they appear, in the ſequel of this chapter, to have imitated fruits, fiſhes, and everything elſe, by making clay moulds, and caſting the wax or other matter into them. It is, by the way, remarkable, that in all theſe caſes of caſting or modelling *cera* is in the ſingular number, and muſt be taken

taken in its literal ſenſe, as being a matter very capable of ſuch a manufacture.

Now on the other hand, when that word is in the plural, there is ſome reaſon to conjecture, that a certain compoſition is meant, capable, as I have ſaid before, of bearing the fire, or when it is laid upon ſhips with a bruſh; for we can neither ſuppoſe, that wax was ever capable ſimply to bear being burnt, as the *encauſticæ picturæ* expreſſes and denotes it; nor that the *ceris igni reſolutis* was to be ſimply laid on their ſhips without paint, roſin, turpentine, or ſome other matters, both to render it ductile and fluid enough not to clog the bruſh as it cooled, which every one muſt allow wax would infallibly do; and alſo to give it ſuch a body, as that, when dry, it might ſtand the injuries of the weather; for the heat of the ſun would melt ſimple wax, and make it run down in ſtreams, without an admixtion of ſomething elſe to give it the neceſſary firmneſs.

The following I believe to be the words, which the Count de Caylus and the French painters have endeavoured to follow. Plin. lib. xxxv. chap. xi.

" Ceris pingere ac picturam inurere quis primus " excogitaverit, non conſtat: quidam Ariſtidis in- " ventum putant, poſtea conſummatum a Praxitile; " ſed aliquanto vetuſtiores encauſtæ picturæ exti- " tere, &c."

Here again is the *ceris* in the plural, where he talks of burning in the picture, and where in the ſame ſentence he calls it *encauſtæ picturæ*. I would, therefore, humbly aſk, whether wax painting, ſtrictly ſpeaking, would ever bear burning in; or whether,

according to the count's manner, a gentle colliquation by a gradual ſlow approach of the picture to the fire, and as ſlow a removal of it back again, can be called *encauſtic painting?*

I might add much more to my purpoſe, by entering into the nature of varniſhes, pottery, glaſs-making, and furnaces of the antients; which would throw more light upon the ſubject, and ſhew, that they were well acquainted with what colours would bear the fire, as well as with ſuch as would not; for Pliny's chapter upon the different pigments muſt have been collected from antient authors as well as from his contemporaries, and contains a catalogue of thoſe uſed by the painters, which conſiſts of a very great number of articles.

That the antients were well acquainted with enamel painting cannot be doubted, ſince there are great numbers of their enamel pieces in the cabinets of the curious in many places. There is one, which is a Roman cup curiouſly enamelled upon braſs, found at Froxfield, in the poſſeſſion of Lord Hertford: there is a Roman enamelled platter upon the ſame metal, probably belong to the cup, with figures and inſcriptions curiouſly painted in the enamel, of Leg. ii. Aug. and Leg. xx.v.v. in Britain, a drawing of which Dr. Stukely made in its colours. (See Buonoroti's Oſſervazzioni on the Duke of Tuſcany's Medallions.) And the Doctor has now an enamelled fibula of the ſame kind of workmanſhip; nor are there wanting cups with portraits of ſome friends enamelled at the bottoms, which were uſed *inter pocula*, to drink to their memories; and I cannot but think it probable,

probable, that the enamelled ware of cups, platters, ewers, and ſuch like, which the great Raphael was concerned in making, many of which are now in England, were made in imitation of the antients; ſince in every other part of his art, he was ſo cloſe a follower of their moſt correct works, and ſince the colours and appearance are exactly the ſame in his, that are upon thoſe antient pieces mentioned. All I have further to ſay is, that if there be any-thing amiſs in theſe conjectures, I freely ſubmit to the judgment and correction of any better judge.

CII. *An Account of the late Earthquakes felt at* Maeſtricht, *in a Letter from Monſ.* Vernede, *Paſtor of the* Wallon *Church there, to Monſ.* Allemand, *Profeſſor of Philoſophy at* Leyden, *F. R. S. Communicated by Mr.* Abraham Trembley, *F. R. S. Tranſlated from the* French.

Maeſtricht, May 1, 1756.

Read May 27, 1756.

THE following are the obſervations, which I have been able to communicate to you, relating to the earthquakes, which we have felt here.

The number of the ſhocks has been very conſiderable. From the 18th of February to the beginning of April no day paſſed, in which one was not

felt, often more. Monſ. Hofman has remarked about 80 diſtinct ones. I was deſirous at firſt to keep a liſt of them, but I could not continue it. The beginning of my liſt is as follows.

1755. Dec. 26, 4 in the afternoon, a ſlight ſhock.
4 ¼ pretty ſmart one, but ſhort.
12 a very ſlight one.
12 ¼ a ſtrong one, and of conſiderable duration.
27, 1 in the morning, a ſmaller ſhock.
1756. Feb. 13, 4 ½ in the afternoon, a ſlight and ſhort one.
14, 3 ½ in the morning, a ſtrong but ſhort one.
18, 8 in the morning, a more violent one than any of the preceding.
9 a ſlight and ſhort one.
9 ½ a little ſtronger one, but ſhort.
12 ¼ a very ſlight and ſhort one.
8 ¾ in the even. a ſlight and ſhort one.
19, 6 in the morning, a ſtrong but ſhort one.
20, 4 in the morning, a leſs violent and ſhort one.

There were even ſome ſucceſſive hours, in which the earth was ſcarce at all quiet; but theſe were only tremors.

The ſtrongeſt ſhock was that of the 18th of February, on the faſt day. It continued, according to my obſervation, about a minute and a half. The next in degree to this was that on the day after Chriſtmas day, which laſted about a minute. There were

were ſome others no leſs violent, in my opinion, but of much leſs duration.

In general they were felt more ſenſibly in the upper rooms than on the ground-floor; and leſs by thoſe, who were then walking either in the city or country, and not at all by many. The motion was likewiſe different, moſt commonly, according to the quarters of the city, and was not the greateſt in the higheſt parts of it.

All the ſhocks were not of the ſame kind. The motion was undulatory in thoſe of the 26th of December, and 18th of February; but the undulations on the former of theſe days were longer than thoſe on the latter.

At other times there were obſerved only a riſing and ſinking again; and moſt commonly a ſhaking on one ſide. I had ſuſpended a weight over my billiard-table ſome lines above the carpet; and I had ſurrounded it with billiard balls. I deſigned to remark by this contrivance the direction, and, to a certain point, the degree of the force: but my balls did not move; nor did I make the experiment till after the great ſhocks were paſſed. With the ſame view Monſ. Hofman had exactly filled with water a large veſſel, which he had powdered all round: but he undertook this method as late as I did mine. Once only ſome drops of water fell from the veſſel. A good number of people pretended to have obſerved the direction; but, in my opinion, there was none ſenſible to us.

During the moſt violent ſhakings there were ſome kind of flaſhes of lightning. The whole was preceded by a groaning under-ground, which, when the

ſhocks

ſhocks were weakeſt, I could compare to nothing ſo well as the noiſe of a cart deeply loaded, heard at a diſtance; and when they were ſtrongeſt, to that of a coach rolling ſwiftly under the place. I have alſo heard more than once theſe groanings, when they were not followed by any ſenſible ſhocks.

Theſe ſhocks have happened in all kinds of weather, dry, rainy, cold, *&c.* only I have always remarked, that it was calm at the time, and the wind roſe afterwards. No hours have been exempt from them. If they have been more felt in the night, this was perhaps, becauſe people were then more quiet, and in their upper rooms; and becauſe fear rendered them attentive to every thing.

During the whole time, that we had theſe earthquakes, the magnetic needle and the barometer very much varied. The latter indicated very dry weather, while it was continual rain.

The weſt-wind blew conſtantly all the preceding ſummer.

A little before the ſhocks began to be firſt felt, we had Auroræ boreales.

When the ſky was clouded, there were often obſerved between the clouds red ſtreaks like fire. Fogs were very frequent. The weather was extremely uncertain. Sometimes it ſeemed to ſet in for fair; but ſoon after there aroſe clouds extremely low from the weſt.

I proceed now to the conſequences of theſe earthquakes. They were not at all fatal here. The conſternation was very great. Several perſons felt very ſingular motions, which they compared to the great electrical ſhock. Afterwards, they imagined every moment,

moment, that there were new ones. The rattling of glaſs-windows was the leaſt ambiguous ſign. China fell down from the chimney-ſhelves. The diſhes in kitchens ſtruck againſt each other. Some chimneys were thrown down. Several walls cracked, and ſome arched roofs were damaged.

In our neighbourhood there happened no worſe accidents than theſe. At Aix la Chapelle, a woman was cruſhed to death by the falling of a chimney. Two houſes, which joined, were ſeparated. The waters, it is ſaid, acquired more ſtrength, as happened at the end of the laſt century. This is what I will not anſwer for the truth of, not having received ſufficient information in that reſpect.

At two leagues diſtance from Stolberg there was formed an opening of about twenty feet long, and ſeveral feet deep, from which, it is affirmed, there aroſe the two firſt days ſtinking vapours: but it filled up of itſelf, and is now almoſt intirely cloſed. This is the fact, which has been ſo much exaggerated in the Gazettes.

My father-in-law was curious to know, what was the effect in the mines of Houille, in the country of Liege; and this is the account, which he received as what might be depended upon.

In a mine of 900 feet depth, the workmen were ſitting at breakfaſt on the 18th of February. Of a ſudden they were puſhed violently one againſt another, ſo that they thought, that ſome of them were at play: but ſeeing, that thoſe, who ſat alone, were ſhaken in the ſame manner, they ran to ring the alarm-bell. The overſeer called out to them from above

above, that it was an earthquake, from which they had no reaſon to be under any apprehenſions.

On the ſame day (18th of February) there was an extraordinary motion in our waters, particularly in the Meuſe, which was agitated as if it were by a whirlwind; and the Jaur, a ſmall river, which runs through our city, and was full before the earthquake, ſunk very low immediately after. In ſome places the waters of wells were troubled; but they were not ſo with us.

The animals were affected by the ſhocks. I was informed, that the horſes and cows made a great noiſe, even a conſiderable time before; and at my houſe the hens and pigeons did the ſame.

CIII. *An Account of the Agitation of the Sea at* Antigua, Nov. 1, 1755. *By Capt.* Affleck *of the* Advice *Man of War. Communicated by* Charles Gray, *Eſq*; *F. R. S. in a Letter to* William Watſon, *F. R. S.*

SIR,

Read June 3, 1756. IN a letter I had from Capt. Affleck, commander of the Advice man of war, dated from Antigua the 3d of January laſt, are the following paragraphs.

" The year was uſher'd in here by the ſhocks of " an earthquake, which is the ſecond I have felt at " this iſland; neither of which have been violent " enough to do any damage. On the 1ſt of No-

" vember

" vember laſt, I find you had a remarkably ſudden
" flux and reflux of the ſea at Portſmouth, and
" other parts of the coaſt, which was agitated in
" like manner, at the ſame time, on the coaſt of
" America, and all theſe iſlands. The tide roſe
" here twelve feet perpendicular ſeveral times,
" and returned almoſt immediately: the ſame at
" Barbadoes. At Martinique, and moſt of the
" French iſlands, it overflowed the low land, and
" returned quickly to its former boundaries. The
" people at Barbadoes were never more aſtoniſhed;
" the riſing water in Carliſle Bay appearing as black
" as ink, inſtead of the clear ſea-green.

" Since I wrote this, I have taken a more par-
" ticular account of the flux and reflux above-men-
" tioned, from an obſerving man of this iſland;
" who remarked, that here it began at half an hour
" after three in afternoon, on the 1ſt of November
" laſt; and flowed, every five minutes, five feet per-
" pendicular, till as much after ſix, without any
" violent diſturbance on the ſurface of the water.

P. S. In Martinique, in that remarkable flux and
" reflux of the ſea, it was in ſome places dry
" for a mile; and, in others, flowed into the
" upper rooms of the houſes, and deſtroyed
" much coffee: At the iſland of Sabia, it flowed
" twenty-one feet; and at St. Martin's, a ſloop,
" that rode at anchor in fifteen feet water, was
" laid dry on her broadſide."

If the Royal Society have not yet had any more particular accounts of this matter from the Weſt-Indies, the above is at their ſervice; and, with my

moſt reſpectful compliments to Lord Macclesfield and the reſt of the lords and gentlemen,

I remain, Sir,

Your very obedient

humble ſervant,

Colcheſter, May 26, 1756.

Charles Gray.

CIV. *An Account of a remarkable Foſſil, in a Letter from* Edward Wright, *M. D. to Mr.* Peter Collinſon, *F. R. S.*

Read June 3, 1756.

I HAVE profited of the occaſion of Sir Thomas Webb's going to England, to ſend you the draught of a pretty curious foſſil, which you will probably receive about the time that this comes to hand. This foſſil I diſcovered in a marble table, in an inn at Ghent, in a tour I made about a month ago to Bruges, and ſome other parts of theſe countries, in company with our ingenious and worthy friend Mr. Needham. This table, the Landlord told us, he purchaſed at the ſale of an ancient family in the neighbourhood, and ſaid he believed the marble was of this country, though he could not be certain.

The foſſil is what is called by naturaliſts *Orthoceratites*, and is one of thoſe, which I think is never found in its recent ſtate. They are, I believe, very rare in England. This is by much the largeſt I have

have ever had occaſion to ſee, and exceeds by many inches the longeſt I have read of. So as we can plainly trace it; it meaſures two feet four inches and 7-10ths in length, as marked at letters A, B, C, *d*. (Tab. xxii.) Fig. 1. It has originally been ſeveral inches longer, as you may eaſily trace out by continuing the ſtrait lines, which terminate its edges, until they meet in a point. Theſe ſhells are of the concamerated kind, and in this ſixty-ſix partitions may be diſtinctly counted, and it muſt certainly have had a conſiderable number more, which are hid by the end part being immerſed too deep in the marble. As the end of it does not appear, I have at Fig. 2. repreſented the narrow extremity of a much ſhorter, but very diſtinct one, in the ſame table, where ſeveral of the kind are to be ſeen, but none near ſo long as Fig. 1. the longeſt, as I remember, not meaſuring above eight inches. In Fig. 2. at F, the ſiphunculus of one of the concamerations pretty plainly appears, and probably all the partitions have originally had the ſame as in the Nautilus.

In the deſign I here ſend you, which I took upon the ſpot, with a crayon, and have ſince worked out as accurately as I could with Indian ink, I have preſerved the juſt dimenſions of all that can be traced of this large ſhell. The marble, in which it is immerſed, is of a coarſe grain, and of a duſky brown colour, interſperſed with a dirty white: of this colour the ſhell itſelf is tinged, and all its concamerations filled with the ſtalactical matter of the marble.

The concamerations or partitions of theſe foſſils reſemble thoſe of the nautili, though it would be very improper to give them that name, for this ſhell is

never ſeen in the ſeas, nor caught at ſuch depths, as we have had occaſion to fathom or ſearch: hence can never be claſſed among the ſailors; nor indeed does it ſeem at all proper for exerciſing that function, from its long narrow pointed ſhape, ſo very different from that boat-like figure requiſite for ſailing. Its concamerations ſeem principally intended for performing the motions neceſſary to the animal, at the bottom of the ſea, and at greater depths, from whence it does not ſeem ever to riſe to any conſiderable height.

Bruſſels, May 18, 1756.

Edw. Wright.

CV. *An Account of the* Orthoceratites: *In a Letter from* Edward Wright, *M. D. to Mr.* Peter Collinſon, *F. R. S.*

SIR,

Read June 17, 1756.

I HAD the honour of ſending you ſome time ago a drawing and ſhort account of a very large Orthoceratites, which I hope you have received. As you are ſo good to accept favourably my poor obſervations, and to honour me with your correſpondence, I here take the liberty to ſend you a few remarks, which the conſideration of this and other foſſils, and of the ſtrata of the ſurface of the earth, naturally lead me to. If I am obliged to differ from Monſ. de Buffon, and other modern theoriſts, it is only for the ſake of truth, and its unalterable laws; it being quite contrary to my inclina-

tion to criticize the works of others, eſpecially thoſe of ſo learned a gentleman, as the above-mentioned academician, for whoſe merit and talents I have a particular reſpect, except where the cleareſt conviction, in oppoſition to his opinions, forces me to ſo diſagreeable a taſk.

I. The Orthoceratites is one of thoſe ſhells, which are never found in the recent ſtate, and is to be claſſed among *Conchæ pelagiæ* of the naturaliſts, which never approach the ſhore, but continue always at great depths of the ſea, contrary to the *littorales*, which frequent the ſhores and ſhallow places; and hence, when found foſſil, are eaſily to be matched with recent ſpecimens.

Pelagian or ocean ſhells are frequently found foſſil very near the ſurface, as every naturaliſt knows, which proves, that ſuch places have formerly been the ſea-ſhore. Hence it is clear, that the cauſe, which tranſported them thither, acted ſuddenly; which agrees perfectly with the account of the deluge given by Moſes in the holy ſcripture; and, at the ſame time, overturns the ſyſtem of Monſ. de Buffon, and the author of Telliamed, who pretend, that the earth was for many ages covered with water, and that in that long courſe of time it was, that the ſhells, which we now find foſſil, were gradually produced; hence that they are to be conſidered as the remains of innumerable ſucceſſive generations of marine bodies, formerly the only inhabitants of the globe. The greateſt depths of the ſea, as yet ſounded, have been found to be about 3000 fathoms, and the ordinary depths are about 150; which makes it evident, that were the theories of theſe gentlemen true, ſuch foſſil

ſhells ought never to be found at leſs depths in the earth than from 150 to 3000 fathoms.

II. Though foſſil ſhells are to be found in almoſt all the plainer parts of the ſurface of the earth, yet there are certain very large tracts, where ſuch bodies are never found, *viz.* the mountains, which ſeem to be the remains of the original ſtrata of the earth. It is true indeed, that there are many eminences, which have been by our modern theoriſts taken for mountains, where ſea-ſhells, and calcareous matter, of every kind, are to be found in great abundance: but theſe are very inconſiderable, and only appear as little hillocks, compared with the large mountains, which contain mines, veins of metal, and precious ſtones, and may be traced in immenſe chains, without almoſt any diſcontinuity from one continent to another; and from continents to neighbouring and oppoſite iſlands, *&c.* inſomuch that all theſe chains not only of the old, but likewiſe of the new world ſeem connected one with another; an obſervation, which alone would indicate the importance of diligently inquiring into their ſtructure, in order to form a true theory of the earth. Monſ. de Buffon and the author of Telliamed, who endeavour to prove, that all mountains have been formed by ſea-currents, and bring one of their principal arguments in proof of this opinion from marine bodies being found in great quantities in the ſtrata, of which they are compoſed, ſeem never to have made obſervations on mountains; elſe they might have obſerved this remarkable difference between them and the calcareous ſtrata of the plains, that the former contain none of thoſe marine bodies, though the latter are almoſt intirely made up of them.

In

In the Alps, Appennines, and Pyreneans, no ſhells nor marine bodies of any kind are to be found: in the *Ochels*, a branch of the large Grampian Mountains in Scotland, which I have had occaſion diligently to examine, I could diſcover no marine bodies. The ſame is obſerved of all the large mountains of Africa, and of Aſia; and in the huge chain of Cordilleres in Perou Monſ. de la Condamine ſearched in vain for ſuch bodies. This kind of mountains, (which indeed alone deſerve that name) are chiefly compoſed of vitrifiable matter; and if they are ſometimes found to contain ſea-ſhells, it is never to great depths, nor in their original metallic or ſtony ſtrata; though ſuch bodies are found in great abundance at the foot of mountains, and in the adjacent valleys, in which there are many eminences in ſome parts continued in ſmall chains, though but of ſmall extent, which contain marble, ſea-ſhells, chalk, and other calcinable matter, but never any veins of metal, though we frequently find in them pyrites, ocre, vitriols, and other minerals, which have been waſhed down from veins of iron and other metals, with which the higher mountains abound, and have afterwards been depoſited in the calcareous ſtrata of the valleys.

III. Monſ. de Buffon pretends, that all mountains have been formed by ſea-currents; and a little afterwards tells us, that all ſea-currents are occaſioned by ſea-mountains. Is it not natural here to aſk, Which of theſe two cauſes pre-exiſted? Can ſuch reaſoning as this, a *circulus vicioſus* of the groſſeſt kind, ever tend to improve our knowledge, or give us juſt views of the works of the great Creator?

The

The learned academician founds his opinion of all mountains having been formed by ſea-currents, principally upon two obſervations. The firſt is, that they are made up of ſtrata compoſed of ſea-ſhells, and petrified marine bodies of different kinds: the ſecond, that in chains of mountains the prominent angles always correſpond with the depreſſed ones on the oppoſite ſide of the valley, in the ſame ſerpentine way as we obſerve in rivers, the banks of which are alternately hollowed and prominent, according to the different reſiſtance they give to the current of the water. This obſervation was firſt made by Monſ. Bourguet, and muſt be owned to be curious and intereſting. Monſ. de Buffon is of opinion, that theſe two eſſential obſervations put together form an invincible argument in proof of his theory, and ſuch as could ſcarce have been expected in ſo ſeemingly obſcure a point. As to the firſt obſervation, that all mountains are made up of ſtrata compoſed of marine bodies, it is ſo far from being true, that *no mountains, properly ſo called*, contain ſuch bodies: and as to the ſecond, of the correſpondence of the oppoſite angles of mountainous tracts, it does not at all prove, as he would have it, that ſea-currents have formed theſe mountains, but only that there have been formerly ſuch currents running between them, which currents have given them that form we now obſerve them to have. To aſſert, that becauſe currents of water have given them that figure, therefore they have produced them, is as ridiculous, as if one ſhould ſay, that a river had reared its own banks, merely becauſe it had given them a ſerpentine form.

IV.

IV. Monſ. de Buffon, who pretends, that the earth was at firſt entirely covered with water, which afterwards dug channels for itſelf, and thus ſeparated the ſea from the land; and the author of Telliamed, who endeavours to prove, that this water goes inſenſibly off by evaporation; and who, as well as Monſ. de Buffon, attributes the number of ſea-ſhells, found foſſil, to the length of time he ſuppoſes the now inhabited parts of the earth to have been covered with water, ſeem not to have given ſufficient attention to an obſervation of conſequence, which is, that the greateſt part of our foſſil ſhells are entirely foreign to Europe, and belong to the Equator or Tropicks. Monſ. de Buffon himſelf ſeems to have been ſomewhat aware, how much this obſervation might make againſt his theory; for he obſerves in anſwer to it, that not to mention ſuch ſhell-fiſh, as inhabit the bottom of the ſea, and from hence, being difficult to be caught, are regarded as unknown and foreign, though they may be produced in our ſeas; by comparing our foſſil ſhells with their analogous living ſhell-fiſh, we ſhall find amongſt them more ſhells belonging to our own coaſts than of foreign ones; for example, that pectens, pectuncles, muſſels, oyſters, ſea-glands, buccina, ſea-ears, patellæ, &c. which we find foſſil almoſt every-where, are certainly productions of our own ſeas. But unluckily for our ingenious theoriſt, theſe ſhells, he mentions as common on our coaſts, are produced in all the ſeas of the globe, and are equally inhabitants of the equator and poles; though we frequently diſcover foſſil ſpecies of them, which are peculiar to the warmer climates.

Since then it is certain, that all our foſſil ſhells are foreign to our climates, except ſuch, as are common to the whole globe, we may conclude, that Monſ. de Buffon's theory is in this reſpect abſolutely defective. Beſides, we find not only a very great quantity of foſſil ſhells and other marine bodies, but likewiſe a great number of impreſſions of foreign plants, moſtly of the capillary kind, on ſlates and other ſtones; and it is now certain, that all the foſſil wood of Loughneagh in Ireland (as in moſt other places, where ſuch wood is found) has been produced in a different climate; and, if I miſtake not, has been compared and found to agree with recent ſpecimens from America. Bones, and even intire ſkeletons of rhinoceroſes, elephants, and other foreign land animals, are diſcovered pretty commonly through all Europe; and in Ireland, very large horns of American mooſe-deer have been dug up. All theſe ſubſtances are commonly found near to, or in the ſame ſtrata with, foſſil ſhells, and other marine bodies; and all of them, whether original productions of ſea or land, appear evidently to have been depoſited in the places, where we now find them, by one and the ſame cauſe. To account for theſe phenomena, I believe Monſ. de Buffon muſt admit a univerſal deluge, ſuch as is related in the Holy Scripture: and if a deluge of this kind is once admitted, why ſhould we aſſign other cauſes for the tranſportation of marine and terreſtrial bodies into climates foreign to thoſe, where they were produced? Why, ſay Monſ. de Buffon and the author of Telliamed, becauſe many thouſands of years ſeem to have been requiſite for the production of ſo immenſe a quantity of ſea-ſhells as thoſe we

find

find every-where foſſil; and beſides, ſays the author of Telliamed, their diſpoſition is ſo regular, that it is plain the confuſion of a deluge could never have placed them in ſuch a manner. But as to the immenſe quantity of foſſil ſhells, upon which theſe gentlemen inſiſt ſo much, they have been miſled by imagining, that many parts of the ſurface of the earth contain marine bodies, which evidently do not; and theſe parts are, as I obſerved above, the mountains properly ſo called, in the conſtituent ſtrata of which no ſea-ſhells nor marine bodies of any kind, no bones of land animals nor impreſſions of plants, are to be found. And as to the regular diſpoſition of theſe bodies, this could not have happened in ſuppoſing a violent commotion of the waters to have continued the whole time they covered the earth. But is ſuch a ſuppoſition natural or neceſſary? From the ſcripture account, I am ſure, it is not; for the *rupti ſunt fontes abyſſi* implies, that this was only to procure water ſufficient for the deluge; and that the waters afterwards receded gradually, and were reſtored to tranquillity before they entirely diſappeared, is manifeſt from the ſame inſpired writings. Upon the whole, we may dare boldly to advance, that we meet with daily obſervations, that deſtroy all the fine hypotheſes of our modern theoriſts, but not a ſingle one in the leaſt contradictory to the ſimple, and at the ſame time ſublime and true account delivered by the ſacred hiſtorian. How vain are the efforts of man, when he has the boldneſs to ſet up the chimæras of his own brain in oppoſition to ſo much of the truth, as Almighty God has permitted us to diſcover from his holy word, and from the obſervation of his works,

which he has given us talents to contemplate and admire!

V. The deluge muſt have produced very conſiderable changes on the ſurface of the earth. Many Volcanos ſeem to have been formed at that time by the accumulation of animal vegetable and mineral ſubſtances into huge maſſes, which have afterwards fermented and putrified, and in proceſs of time burſt out into flames. Earthquakes muſt have been frequent the firſt years after the deluge by the fermentation of theſe heterogeneous bodies, before the remains of ſo prodigious an inundation could be diſſipated; for wherever there is any inteſtine commotion in the earths, it's violence muſt be greatly increaſed, if it meets with water, and by its heat reduces it into vapour, which we know acts with an immenſe force *. That this muſt have been the caſe the firſt years after the deluge, may be inferred from the abundance of moiſture it muſt have left, and the fermentation of ſo great a quantity of heterogeneous ſubſtances buried in ruins by that memorable cataſtrophe. There are many obſervations, which ſeem to prove, that the earth, or at leaſt many parts of its ſurface, have ſuffered by fire; not to mention the marks of it, which are to be obſerved on many mineral ſubſtances. The artificial production of potter's earth or clay is a very ſtrong argument in ſupport of this opinion. Potter's earth, as is well known, is

* This ſeems to be the reaſon, why places ſituated upon the ſeaſhore, or upon large rivers, as was the unhappy city of Liſbon, ſuffer more from earthquakes than more inland ſituations, where ſuch circumſtances do not concur.

found

found plentifully in moſt low grounds and vallies between mountainous tracts, and where calcareous ſtrata abound. By expoſing common flint-ſtones to the confined vapour of boiling water in Papin's digeſter, a clay of the very ſame kind may be formed, and is no more than a decompoſition of the flints. Hence it would appear, that wherever this clay is to found, there the earth has undergone ſome violence from fire; and that this has been effected by earthquakes ſoon after the deluge ſeems extremely probable.

The deluge has given origin to many foſſil ſubſtances, and produced many combinations, which otherwiſe would not have happened. Chalk is no more than the ruins of ſea-ſhells, and limeſtone conſiſts of the ſame bodies cemented together by a ſtony juice. Amber appears evidently to be the reſin of antediluvian trees (which are frequently found along with it at this day) united to the acid of ſea-ſalt, which abounds in the earth. The reaſon of inſects, ſtraws, &c. being immerſed in amber, abſolutely inexplicable from the hypotheſis of its being of mineral origin, is now no more a ſecret; for we know, that nothing is more common than to find ſuch bodies immerſed in the reſin of trees. Foſſil ſea-ſalt or ſalt-gem ſeems to have been depoſited in the quarries, from whence it is dug, at the time of the deluge. All or moſt part of pit-coal appears to be of diluvian origin, for it gives a *caput mortuum*, the texture of which exactly reſembles that of burnt wood. We may reaſonably ſuppoſe large foreſts to have been buried at the time of the deluge, which have undergone a fermentation and putrefaction in the earth, ſo that the colour of the woody part has been

been changed, though the texture has remained entire enough to allow us to diſtinguiſh to what kingdom it belongs.—All bitumens, piſſaſphaltum, peſſilæum, &c. ſeem to be no more than productions of reſinous ſubſtances united with mineral acids, which have caught fire in the earth by fermenting with heterogeneous matter, and have thus undergone a ſort of natural diſtillation and exaltation. Theſe are more than chimerical notions, and are even demonſtrated by experiments; for amber can be produced artificially, as likewiſe bitumens by the diſtillation of reſinous ſubſtances with mineral acids; and there is great probability, that pit-coal might be imitated. I am,

SIR,

Bruſſels, June 11, 1756.

Your moſt obedient and obliged humble ſervant,

Edward Wright.

CVI. *A Retractation, by Mr.* Benjamin Wilſon, *F. R. S. of his former Opinion, concerning the Explication of the* Leyden *Experiment.*

To the ROYAL SOCIETY.

Gentlemen,

Read June 24, 1756.

I Think it neceſſary to retract an opinion concerning the explication of the Leyden experiment, which I troubled this Society with

with in the year 1746, and afterwards publiſhed more at large in a Treatiſe upon Electricity, in the year 1750; as I have lately made ſome farther diſcoveries relative to that experiment, and the minus electricity of Mr. Franklin, which ſhew I was then miſtaken in my notions about it.

What I mean by the minus electricity of Mr. Franklin, regards the minus electricity of the Leyden experiment only, which that gentleman diſcovered.

I ſhall be very glad to have this acknowledgment made public; and, to anſwer that end the moſt effectually, I wiſh it may have a place in the Tranſactions of the Royal Society.

I am,

Gentlemen,

London, June 24, 1756.

Your moſt obedient

humble ſervant,

Benj. Wilſon.

CVII. *An*

CVII. *An Account of the extraordinary Agitation of the Waters in ſeveral Ponds in* Hertfordſhire: *In a Letter from the Rev.* Thomas Rutherforth, *D. D. F. R. S. to the Rev.* Samuel Squire, *D. D. F. R. S.*

Dear Sir,

Read July 1, 1756. I Have lately had an opportunity of of making ſome enquiries about an unuſual motion of the water in a pond at Patmer-hall, which is a farm in the pariſh of Albury, and county of Hertford. Mr. Thomas Mott, who is the occupier of the farm, tells me, that there are two ponds in his yard, which are parted from one another only by a cauſey, which is juſt wide enough to allow of a convenient paſſage for a waggon and driver: the cauſey runs from north to ſouth; ſo that one of the ponds is to the weſt, and the other is to the eaſt of it. At the weſtern end of the former, which is the head of it, are two drains, one higher than the other, to carry off the waſte water; and on each ſide, at the other end, cloſe to the cauſeway, is a mouth, or opening, where his cattle go to drink. The pond itſelf is about eight roods over, and twelve roods long: The other pond is of the ſame ſize; except, that there is a dove-houſe in the middle of it, which ſtands upon a ſmall iſland. On the firſt day of November laſt, between ten and eleven o'clock in the forenoon, his ſervants, who were then cloſe to theſe ponds, heard a rumbling noiſe, like the wind;

wind; and took notice, that three ducks, which were then in the weſtern pond, immediately flew out of it into the other, as if they were affrighted. At the ſame inſtant the water in the weſtern pond aroſe at the head of it, ſo as to run out of the lower drain, which was ten or twelve inches above the level. He did not ſee this ſwell of the water himſelf; but his ſervants, who ſaw it, called him immediately; and he found, that the water was then in motion; and that it had run out of the drain. It continued to move backwards and forwards for ſome time; but he obſerved, that it did not ſwell any more at the head, but only aroſe and fell by turns at the two mouths; ſo that the motion was then from north to ſouth. When it aroſe at either of the mouths, it flowed about ſix feet beyond what was then the water-mark. The other pond, during the whole time, was as calm and ſtill, as he ever ſaw it; nor had his ſervants obſerved any motion in it, unleſs what was occaſioned by the alighting of the ducks.

Mr. Mott tells me farther, that Wickham-hall, which is another farm, about two miles and a half from him, in the pariſh of Biſhop-Stortford, in the ſame county, a pond was moved at the ſame time in the ſame manner; and that the firſt motion of it was from eaſt to weſt. This account he had from a perſon, who ſaw it. He adds, that a like motion was obſerved in a pond at Thaxted, in the county of Eſſex: but of this he knows no particulars.

At Royſton, in the county of Hertford, Mr. Newbell, an officer of the exciſe, obſerved an unuſual motion in the pond, at ten o'clock in the fore-

noon, November 1, laſt paſt. The pond is a large one, and almoſt round. The bank of it, towards the north, is faced with a brick-wall; and the bottom of it ariſes from thence, in a ſlope, towards the ſouth. The water aroſe from north to ſouth, ſo as to go five feet and a half beyond the water-mark. In his return it aroſe againſt the brick wall, the top of which was about one foot above the level of the water, ſo as to run over it. The water afterwards moved from north to ſouth, and back again, five times before it ſtopped. I am,

Barley, June 15, 1756.

Dear Sir,

Very faithfully yours,

T. Rutherforth.

CVIII. *Some Conſiderations on a draught of two large peices of Lead, with* Roman *Inſcriptions upon them, found ſeveral years ſince in* Yorkſhire. *By* John Ward, *LL.D. Rhet. Prof.* Greſh. *and V. P. R. S.*

Read July 1, 1756.

SOME time ſince a draught of two large peices of lead, ſimilar to each other, was communicated to this Society by a worthy member, Henry Stuart Stevens, Eſquire (1). The account then given of them, which accom-

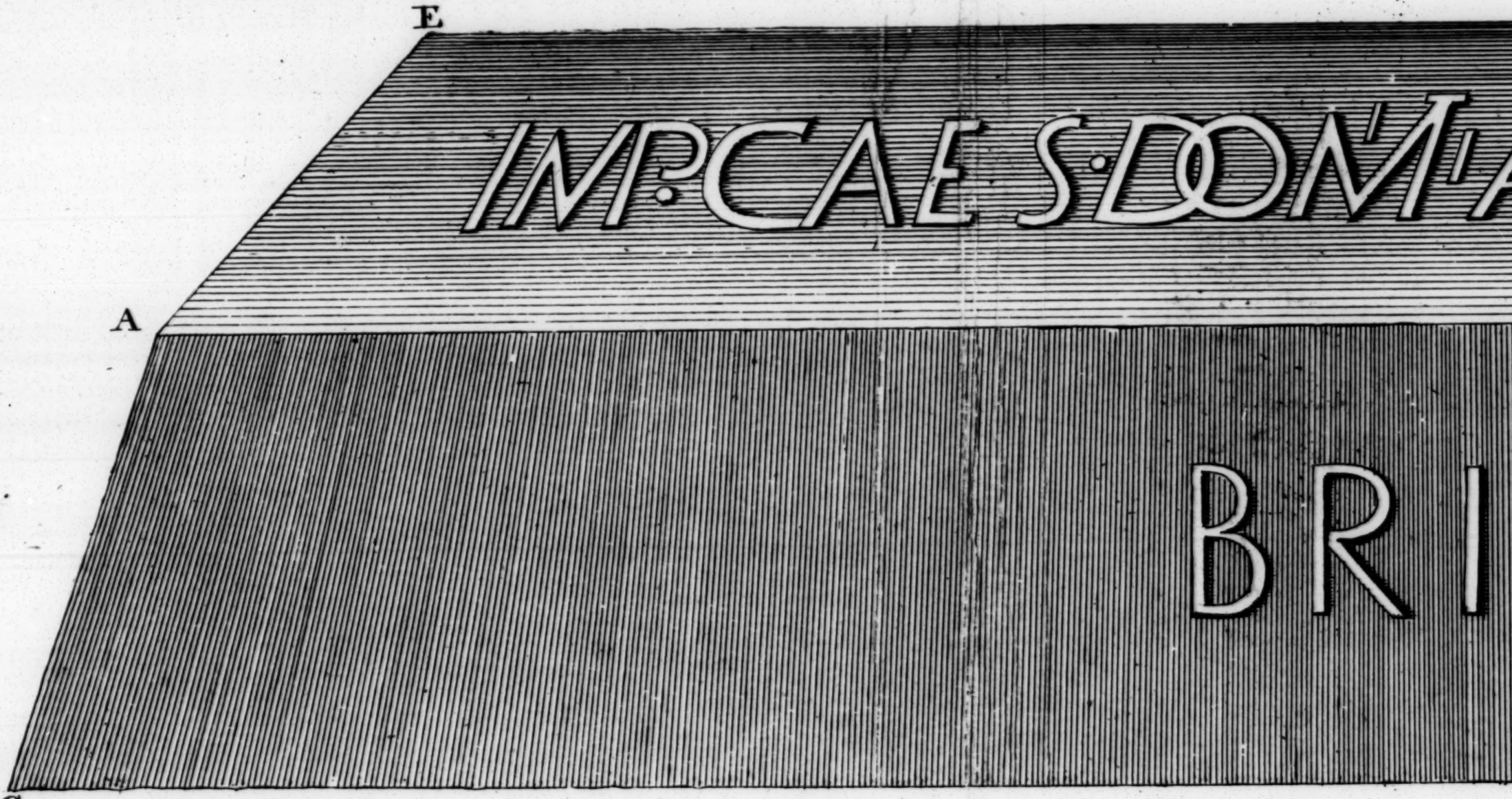
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(1) January 31, 1754.

panied

A Draught of two peices of lead, s

found on Hayſhaw moor *in* Y



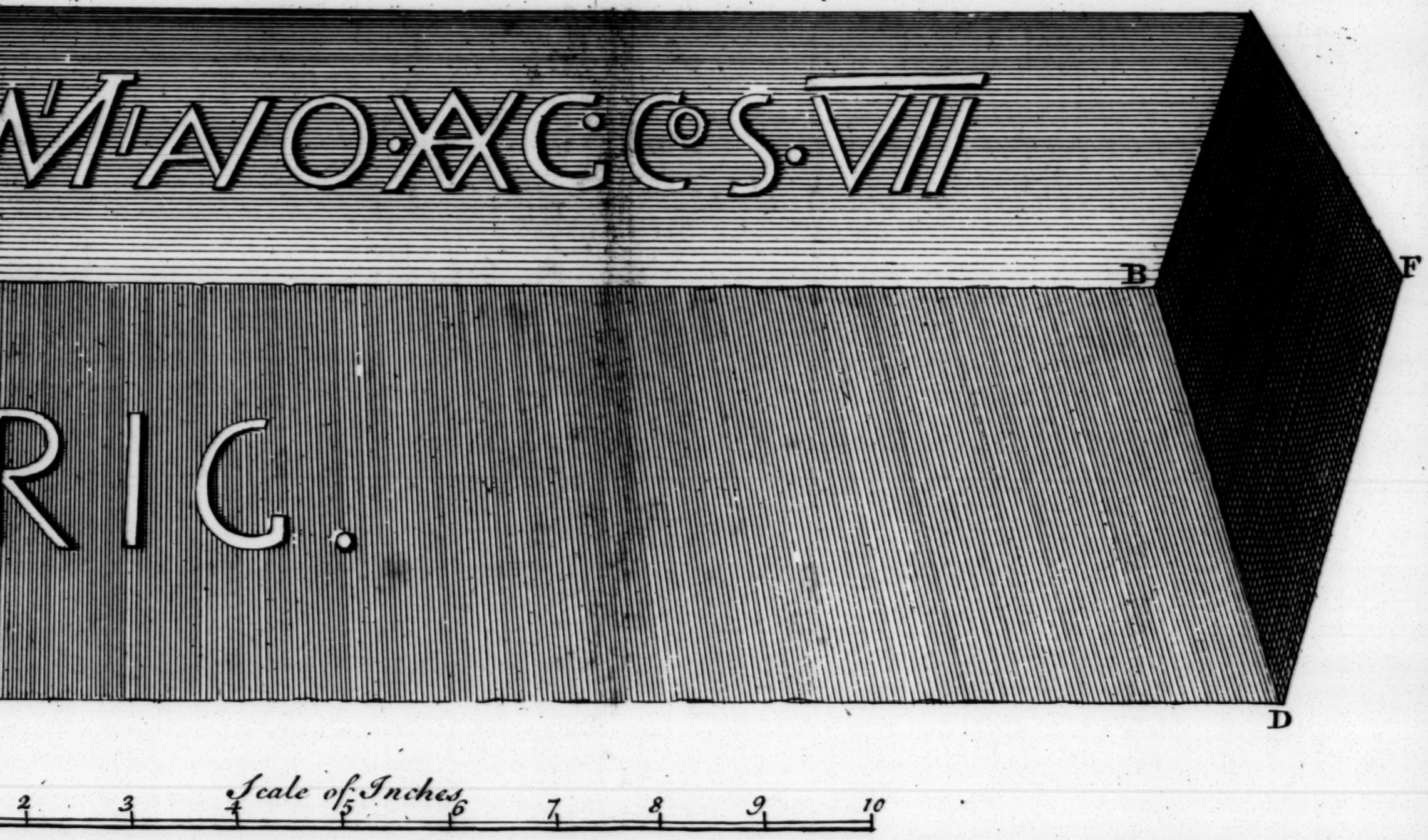
			Inch.
Length	*at the top from* A *to* B	*is*	21
	at the bottom from C *to* D		23 ½
Breadth	*at the top from* A *to* E		3 ½
	at the bottom from D *to* F		4 ¼
	perpendicular thickneſs		4



The top is somewhat

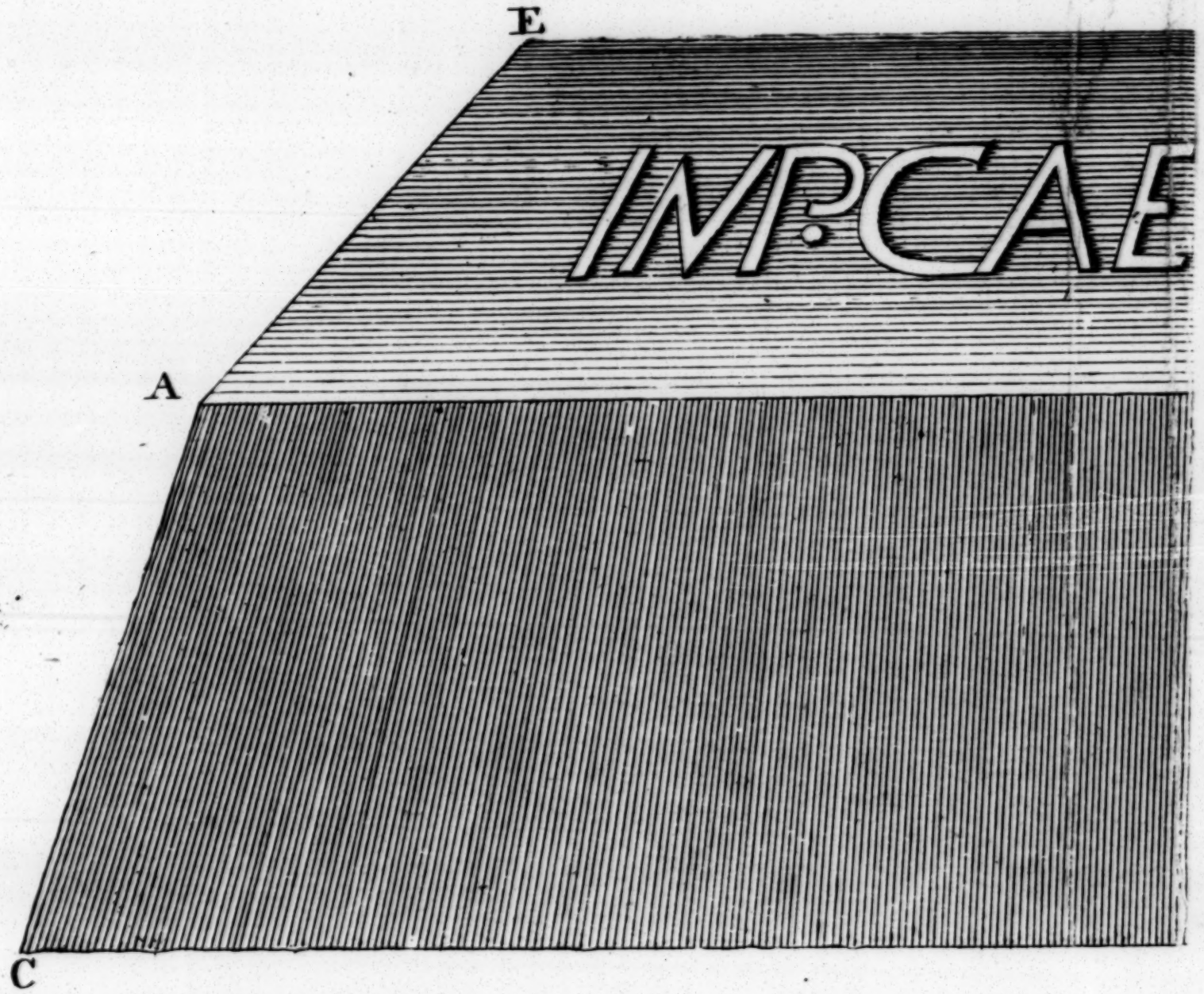
Weight of the lead,

s of lead, similar to each other,
moor *in* YORKSHIRE.



omewhat hollow, and the letters are in relief.
he lead, 1 hundred, 1 quarter, and 16 pounds.

J. Mynde Sc.



				Inch.
Length	*at the top from* A *to* B	}	*is*	21
	at the bottom from C *to* D			23 ½
Breadth	*at the top from* A *to* E			3 ½
	at the bottom from D *to* F			4 ¼
	perpendicular thickness			4

panied the draught, was as follows: "They were "found in February 1734, one foot and half under-"ground, on Hayſhaw Moor, belonging to Sir "John Ingilby, baronet, in the manor of Dacre, "near Pateley bridge, in the Weſt Riding of York-"ſhire. The weight of each peice is one hun-"dred, one quarter, and ſixteen pounds." The form of them, as likewiſe two Roman inſcriptions impreſſed on them in relief, will appear by the draught annexed to this paper, and reduced to half the ſize of the original (Tab. xxiv.). The larger inſcription, which is placed on the top, may be thus read in words at length:

Imperatore Caeſare Domitiano Auguſto, Conſule VII.

And the leſſer, on the ſide:

Brigantum.

When this draught came firſt before the Society, I took the liberty of ſaying, that I apprehended thoſe peices of lead were part of the tax, which at that time was paid to the Romans out of the lead mines in Britain. The reaſons for which opinion I now beg leave to offer more at large (2).

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(2) Since this paper was writen, I have found, that another draught of thoſe peices of lead, with a breif account of them, had formerly been communicated to the Society, not long after they were diſcovered; and publiſhed in their *Tranſactions*, Vol. XLI. Num. 459. p. 560. That account differs very little from this, either as to the form, dimenſions, and weight of the two peices of lead; or the time, and place, of their diſcovery. But no attempt is there offered to explain the deſign, for which they were made.

But before I enter upon this, it may be proper to obſerve, that Camden has publiſhed two Roman inſcriptions, impreſſed likewiſe on peices of lead, which were found on the ſhore, at the mouth of the river Merſey in Cheſhire, while he was reviſing his deſcription of that country, And the account he gives of them is this: *Dum haec recognovi, a fide dignis accepi viginti maſſas plumbeas hic in ipſo litore erutas fuiſſe, forma oblongiori ſed quadrata, in quarum ſuperiori parte in concavo haec legitur inſcriptio:*

IMP. DOMIT. AVG. GER. DE CEANG.

In aliis vero:

IMP. VESP. VII. T. IMP. V. COSS.

He ſuppoſes them to have been erected as a monument of a victory over the *Cangi*, as appears by his following words, which are theſe: *Quod monumentum videatur erectum fuiſſe ob victoriam in Cangos* (3). And this he ſuppoſes to have been done in the reign of Domitian, while *Julius Agricola* was *propraetor* in Britain. It is plain from the words, *a fide dignis accepi*, that Camden himſelf had not ſeen thoſe

(3) *Britann.* p. 463, *edit.* 1607.

peices

peices of lead. However from his deſcription of them, as imperfect as it is (for he neither gives us their weight, nor dimenſions) it ſeems highly probable, that they were of the ſame kind, and deſigned for the ſame uſe, with thoſe repreſented by this draught. But as Camden conſidered them only as a monument of a victory, I ſhall now proceed to offer my reaſons for differing from that learned writer in this particular.

At the time theſe peices of lead were caſt, Britain was a Roman province, and had been ſo from the reign of *Claudius*. For *Caeſar*, as Tacitus ſais, was the firſt Roman, who invaded Britain; but did little more, than ſhow it to his ſucceſſors. After which the civil wars, and diſſentions in the Roman ſtate, diverted them from any thoughts of Britain; ſo that no attempts were made againſt it during the three following reigns (4). But *Claudius*, who ſucceeded next to the empire, being ambitious of a triumph, was prevailed on to undertake an expedition againſt Britain. For this purpoſe he ſent hither a large body of Roman forces, and not long after coming over himſelf landed in Kent. The Britons were then governed by ſeveral independent princes, who not being able to withſtand the Romans, ſome of them ſubmited; and *Claudius* in a ſhort time returning again to Rome, was honoured with a ſplendid triumph. And the army, which he left behind him, not only maintained what they had gotten, but advancing farther into the country inlarged their conqueſts; ſo that during the reign of *Claudius*, as Tacitus informs

(5) *Vit. Agricol. cap.* 13.

us,

us, *Redacta paulatim in formam provinciae proxima pars Britanniae, addita inſuper veteranorum colonia, quaedam civitates Cogiduno regi donatae* (6). Where by the Words, *proxima pars Britanniae*, muſt be underſtood the ſouth eaſt parts neareſt the continent (7).

From this time a Roman governor was uſually appointed to reſide here, as in other provinces of the empire. And in the next reign, which was that of *Nero*, the Romans continued to gain freſh conqueſts; though the Britons, who were very uneaſy in this ſtate of ſervitude, made ſeveral efforts to regain their liberty, and particularly under the conduct of queen *Boadicea*. When, as the ſame hiſtorian relates, Britain had been loſt, if the Roman governor *Paullinus*, who was imployed in the reduction of the iſle of Angleſey, had not ſpeedily returned, and given the enemy a total defeat (8).

After this no freſh diſturbances aroſe till the reign of *Veſpaſian*, who aſſumed the empire near the end of the year 69. In the year 71 the Roman army under *Cerealis* having attacked the *Brigantes*, a northern people, and very numerous, conquered a great part of their country (9). And in the year 76 the *Silures*, inhabitants of Wales, a powerful and warlike people, were in like manner ſubdued by *Frontinus* (10).

The next Roman legate in Britain was *Julius Agricola*, a man of equal courage and prudence; who in the year 78, being ſent by *Veſpaſian* to go-

(6) *Ibid. cap.* 14. (7) See *Horſley's Brit. Rom. p.* 33.
(8) *Tac. ubi ſupra, cap.* 16, 18. (9) *Tac. ibid. cap.* 17.
(10) *Ibid.*

vern the province, marched firſt againſt the *Ordovices*, a people of North Wales, by whom a body of Roman ſoldiers, ſtationed near them, had lately been almoſt intirely cut off; in return for which, having given them a total defeat, he deſtroyed in a manner the whole nation (11). After this his view was to reduce the iſle of Angleſey, which upon his approach ſurrendered to him (12). And winter then coming on, he applied himſelf to redreſs the greivances of the inhabitants, and particularly the unjuſt exactions made upon them by the officers of the revenue, in order to prevent any future diſturbances. At the approach of ſummer he drew out his army, and gave the enemy no reſt, by making ſudden inroads upon them, and waſting their country. And when he had ſufficiently terrified them, he deſiſted, and ſhewed them the allurements of peace; by which many ſtates ſubmited, gave hoſtages, received garriſons, and permited the building of forts. The winter following was ſpent in ſchemes to ſoften and poliſh this rude and uncultivated people, by incouraging and aſſiſting them to build temples (13), places of public reſort,

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(11) *Ibid. cap.* 18. (12) *Ibid.* (13) The largeſt and moſt beautiful moſaic pavement, which has hitherto appeared in Britain, was diſcovered ſome years ſince in Littlecote park, near Ramſbury in Wiltſhire, and now poſſeſſed by Edward Popham, eſquire. It ſeems, by the form and ſize of it, to have been the area of a heathen temple, conſiſting of two parts, as thoſe buildings uſually did, namely, a *templum* and *ſacrarium*. And from ſome coins of Veſpaſian, which were found with it, that temple might not improbably have been one of thoſe, which were erected here, while Agricola governed in Britain. A print of this curious remain of Roman antiquity was lately ingraved by Mr. George Vertue.

and

and fine houſes; the noblemens ſons were inſtructed in the liberal arts, drawn into an eſteem of the Roman language and habit, and by degrees the inducements to luxury, as porticos, baths, and coſtly banquets; which, as the hiſtorian adds, *apud imperitos humanitas vocabatur, cum pars ſervitutis eſſet* (14). The third campaign diſcovered new people, when marching ſtill northward he ſubdued all, who oppoſed him, to the borders of Scotland, where he built caſtles. And the next ſummer was imployed in ſecuring and ſettling the conqueſts, which he had hitherto made; ſo that the Romans were then abſolute lords of all on this ſide. The two ſucceeding years were imployed in freſh conqueſts northwards, and the year following, or near it, *Agricola* was recalled by the emperor *Domitian*. Such was the ſtate of affairs in Britain during the government of *Agricola*, when the Romans injoyed the fruits of their conqueſts, and the Britons grew more eaſy under the yoke.

In the Roman provinces the next officer under the governor was the *procurator*, who had the care and charge of the revenues, and by illegal exactions often oppreſſed the inhabitants. This was one of the greivances complained of by the Britons, at the time of their revolt under queen *Boadicea*, when they ſaid: *Singulos ſibi olim reges fuiſſe, nunc binos imponi; e quibus legatus in ſanguinem, procurator in bona ſaeviret* (15). Now the taxes levied by the Romans on the provincials were of two kinds, called *tributa*

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(14) *Tacitus, ibid. cap.* 21. (15) *Ibid. cap.* 15.

and

and *vectigalia* (16). The former conſiſted cheifly of a capitation tax, and a tax upon lands; both which, as occaſion required, had in the time of the republic been frequently levied on the citizens of Rome (17). All other duties beſides theſe came under the name of *vectigalia*, and were principally four: a certain portion of the grain produced by arable land, which was uſually a tenth; payments made for grazing cattle in paſture grounds, or foreſts; cuſtoms upon goods imported, or exported; and the produce of mines (18). But this diſtinction, between the uſe of the words *tributum* and *vectigal*, is not always obſerved by Roman writers. The *vectigalia* were generally farmed out to Roman citizens of the equeſtrian order, who held them at a certain annual rent, and were called *publicani* (19). So Livy, ſpeaking of the mines in Macedonia, ſais: *Eas ſine publicanis exerceri non poſſe* (20). And as this affair was too large and expenſive for the fortune of ſingle perſons, it was managed by different ſocieties, or corporations, who rented one or more ſpecies of a whole province, which were let together. Tacitus refers to theſe ſocieties, when he ſais: *Frumenta, et pecuniae vectigales, cetera publicorum fructuum, ſocietatibus equitum Romanorum agitabantur* (21). And Cicero calls them *ſocietates vectigalium* (22). They uſually reſided at Rome; but had

(16) *Cujac. Obſervat. Lib.* VII. *cap.* 4. (17) *Feſtus in voc.* Tributorum. (18) *Burmann. De vectigal. Lib.* I. *p.* 3. and *Lib.* VI. *p.* 77. *edit.* 4*to.* (19) *Leg.* I. §. I. *Dig. de publican. et vectigal. et commiſſ. Leg.* 16. *Dig. de verbor. ſignif.* (20) *Lib.* XLV. *cap* 18. (21) *Annal. Lib.* IV. *cap.* 6. (22) *Pro Sext. cap.* 14.

deputies (23), and other inferior officers, in the provinces; who tranſacted their affairs there, and diſpoſed of their effects.

Pliny obſerves, that the lead mines in Britain were in his time very large, and eaſily worked, as they lay near the ſurface of the earth. His words are theſe: *Nigro plumbo ad fiſtulas laminaſque utimur, laborioſius in Hiſpania eruto, totaſque per Gallias; ſed in Britannia ſummo terrae corio adeo large, ut lex ultro dicatur, ne plus certo modo fiat* (24). And then he proceeds to acquaint us with the annual rent, at which one of thoſe mines was farmed in *Baetica*, the more ſouthern province of farther Spain. *Mirum*, ſais he, *in his ſolis metallis, quod derelicta fertilius reviveſcunt. Nuper it compertum in Baetica Santarenſi* (25) *metallo, quod locari ſolitum* X. CC. M (26) *annuis, poſtquam obliteratum erat,* CCLV (27) *locatum eſt.* The former of theſe ſums makes of our money ſix thouſand four hundred fifty eight pounds, ſix ſhillings, and eight pence; and the latter, eight thouſand two hundred thirty four pounds, ſeven ſhillings, and ſix pence; computing the value of a Roman denary at ſeven pence three farthings, as Dr. Arbuthnot has done in his tables.

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(23) *Zacchaeus* ſeems to have had this office in Judaea, as he is ſtiled ἀρχιτελώνης, and ſaid to have been *rich*; whereas St. *Matthew* is only called τελώνης. *Luke* xix. 2. *Matth.* x. 3. *Luke* v. 27.

(24) *N. H. Lib.* xxxiv. *cap.* 17. (25) *Santarenſe* was the name of the mine here ſpoken of, as Harduin has ſhewn in his notes upon this place. (26) That is, *denariorum ducentis millibus.* (27) That is, *ducentis quinquaginta quinque millibus.*

What Pliny ſais of the lead mines in Britain, plainly relates to his own time, and ſhews they were then ſubject to a Roman tax. And as he lived to the year 80, or near it, that very well agrees with the dates of the ſeveral inſcriptions on the peices of lead now under conſideration. The earlieſt of theſe dates, which is in one of Camden's inſcriptions, namely, IMP. VESP. VII. T. IMP. V. COSS. anſwers to the year 76, in the *Faſti Conſulares*. And that in the draught, which is IMP. CAES. DOMITIANO. AVG. COS. VII. to the year 81 (28). And though the other inſcription in Camden has only IMP. DOMIT. AVG. GER. without a date; yet, as the title *Germanicus* appears on ſome coins of *Domitian* at the be-

(28) With regard to this inſcription, it may not be amiſs to obſerve, that although Domitian held his ſeventh conſulate in the year 80, as appears by the *Faſti*; yet, as he is here ſtiled *Auguſtus*, the inſcription muſt refer to the year 81, in which he ſucceeded to the empire, upon the death of his brother Titus, and took the office of conſul for the eighth time the following year. Nor are there wanting ſeveral other inſtances of the like nature, in which the laſt preceding conſulate of the Roman emperors continued to be inſerted in their inſcriptions, among their other titles, till they reſumed that office again. Thus *Occo, p.* 181, gives us an inſcription of Trajan, with *Trib. poteſt.* 18, *Coſ.* 6. Where the date of his tribunicial power anſwered to that of his reign, which *Pagi* obſerves to have been the uſual cuſtom, *Proleg. ad Diſſert. Hypat.* §. 6. But Trajan held his ſixth conſulate in the year 112, which was the fifteenth of his reign. So likewiſe in the *Append. ad Marm. Oxon. N.* 162, there is a Greek inſcription of Hadrian, with Δημαρχικῆς ἐξουσίας τὸ ί, ὑπάτου τὸ γ'. that is, *Trib. pot.* 10, *Coſ.* 3. Though Hadrian's third conſulate was in the ſame year of his reign. And to mention no more, *Fabretti, p.* 451, has publiſhed an inſcription of the ſame emperor, in which is, *Tribuniciae poteſt.* 19, *Coſ.* 3, being but two years before his death.

gining of his reign, before he aſſumed it as a *cognomen* (29), it is not improbable, that this peice of lead might alſo have been caſt within the time, when *Agricola* was governor of Britain.

The method of caſting the lead, when ſeparated from the ore, into large peices of a proper ſize, form, and weight, was very proper; as well to aſcertain their quantity, as to render them portable, and fit for ſale. And they might be marked with the name of the emperor for a like reaſon, as when it was put upon the coins; namely, to authoriſe the ſale of them by vertue of his permiſſion. The year likewiſe, and the name of the people, where the mines lay, were neceſſary to be added, for the ſake of the proprietors; in order to adjuſt their accounts with the officers, and prevent frauds in the execution of their truſt. And it is obſervable, that the method now made uſe of in our lead mines is not much different from this. For the metal, while liquid, is caſt in an iron mold into large peices, which from the ſhape of them are uſually called *pigs*; and, as I have been informed, are upon an average near the ſame weight, with that ſpecified in the draught. And they are likewiſe commonly marked with the initial letters of the name of the ſmelter, or factor, and ſometimes both, before they are ſent from the mines.

Camden might poſſibly take theſe peices of lead for the monument of a victory, by ſupplying *victoria*, or *monumentum victoriae*, before the words DE CEANG. for *Ceangis*; the ſame people, as he ſup-

(29) See *Vaillant*, *Numiſm. imp. Rom. praeſtant. Tom.* II. *ed.* 3. *p.* 113. And *Sueton. in vit. Domit. c.* 13.

poſes,

poſes, with the *Cangi*; and whom, from the authority of this inſcription, he would place in that country. But this ſupplement will not anſwer, when applied to *Brigantum*, the name of the people mentioned in the inſcription upon the draught. For *victoria*, or *monumentum victoriae*, *Brigantum*, would rather mean *a victory gained by the Brigantes*, than *over them*. I would therefore ſupply the word *vectigal* in both inſcriptions, and read *vectigal de Ceangis*, and *vectigal Brigantum*; for the ſenſe will be much the ſame in either conſtruction, as the former will ſignify *a tax levied on the Ceangi*, and the latter *a tax paid by the Brigantes*. Horſley indeed queſtions the genuineneſs of theſe inſcriptions in Camden; partly from his aſſigning this ſituation to the *Cangi* upon their authority, which he can by no means agree to; and partly from their giving the title *imperator* at the ſame time, as he apprehends, to *Veſpaſian*, *Titus*, and *Domitian* (30). But neither of theſe reaſons appears ſufficient to invalidate their authenticity. For as to the ſituation of the *Cangi*, concerning which our antiquarians differ very much in their ſentiments, the finding of thoſe peices of lead at the mouth of the river Merſey in Cheſhire, is no proof of their having been made in that country. As twenty of them were found together, it ſeems highly probable, they were the remains of the cargo of ſome veſſel laden with them, which had been caſt away on that ſhore; but the place from whence they were brought muſt remain uncertain, till the ſituation of the *Cangi* has been firſt ſettled. Be-

(30) *Britann. Rom. tag.* 34, 316.

ſides,

fides, the name of the people is not mentioned in one of thoſe in Camden; which might then have been defaced, or omited by the tranſcriber. And as to the other objection of Horſley, from the title of *imperator* being given to *Veſpaſian*, *Titus*, and *Domitian*, at the ſame time, in thoſe two inſcriptions; that the peices of lead, which contain them, muſt have been caſt at ſome years diſtance from each other, has been ſhewn already (31).

As to Camden's deſcription of them, as *monumentum erectum ob victoriam in Cangos*, if from their number he ſuppoſed them to have been ſet together in the form of a trophy; how they could well have been placed in ſuch a ſituation, I do not apprehend; nor have I ever met with any inſtance of a ſimilar nature. He mentions indeed another inſcription upon lead, found near Ochie hole in Somerſetſhire, of which he gives the following account: *Non procul ab hoc, regnante Henrico* VIII, *aratro eruta fuit oblonga plumbi lamina in trophaeum olim erecta, et ſic inſcripta:*

TI. CLAVDIVS CAESAR AVG. P. M.
TRIB. P. VIIII. IMP. XVI. DE BRITAN (32).

The ſize of the lead is not here given; but as he calls it *lamina*, a plate, that might indeed be fixed up ſomewhere, as a ſort of trophy, or monument. Which ſeems confirmed by a coin of that emperor,

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(31) *Pag.* 695.

(32) *Britann. pag.* 168. *edit.* 1607. A more particular account of this may be ſeen in Leland's *Aſſertio Arturii*, *p.* 45. where the inſcription is read ſomewhat differently.

with

with the ſame inſcription, and a triumphal arch on the reverſe, as Camden obſerves; who places it in the year 50, which anſwers to the ninth tribuneſhip of Claudius. And the like may be ſaid of another ſuch inſcription upon a peice of lead, weighing about fifty pounds, and found in the ſame county; which is publiſhed by Horſley, and is as follows:

IMP. DVOR. AVG. ANTONINI
ET VERI ARMENIACORVM (33).

It was then in the library of the lord viſcount Weymouth at Longleat (34); though upon inquiry I do not find, that it is there now (35). But it was not unuſual with the antients to cut inſcriptions ſometimes on tables of lead. Thus Tacitus ſais: *Reperiebantur ſolo ac parietibus erutae humanorum corporum reliquiae, carmina et devotiones, et nomen Germanici plumbeis tabulis inſculptum* (36). And Dion, ſpeaking of the ſame ſubject, calls them, ἐλασμὰτι μολίβδινοι (37). However, thoſe large and thick maſſes of lead deſcribed by Camden, and repreſented by the draught, ſeem to have differed no leſs from theſe

(33) *Brit. Rom. Somerſetſh. num.* x. (34) *Ibid. pag.* 328.

(35) The Rev. Dr. Stukeley has ſince obliged me with a more particular account of this plate of lead, as it was communicated to him by the Right Honourable Heneage Earl of Winchelſea. The Doctor ſais, it was one foot nine inches long, two inches thick, three and a half broad; weighed fifty pounds; and was found in the ground of the Lord Fitzharding, near Bruton in Somerſetſhire. A draught of which, with the inſcription, may likewiſe be ſeen in his *Itinerar. Curioſ. p.* 143.

(36) *Annal. Lib.* II. *cap.* 69. (37) *Lib.* LVII. *pag.* 615. *edit. Leunclav.*

plates or tables, in the uſe of them, than they did in their figure. Nor can I apprehend, the former were deſigned for any other purpoſe, than that above mentioned. But as they are very remarkable, and perhaps the ſingular remains of that kind, relating to the Roman government, either here in Britain, or any other part of their dominions; they may deſerve the further conſideration of the curious, in their inquiries into theſe ſubjects.

CIX. *Two Eſſays addreſſed to the Rev.* James Bradley, *D. D. and Aſtrom. Reg. by Mr.* Charles Walmeſley, *F. R. S.*

Reverend Sir,

Read Nov. 4, 1756. I HAVE taken the liberty to addreſs to you two little eſſays, that relate to aſtronomy; for as no one is more maſter of that ſcience, or has enriched it with greater diſcoveries, than yourſelf, you can beſt judge of the worth and uſe of any performance in that kind. The firſt eſſay is a Theory on the Preceſſion of the Equinoxes, and the Nutation of the Earth's Axis; which, as it is indebted to you for the diſcovery of the cauſe, on which it is founded, as alſo for the ſettling of the effects, with which its reſult is to be compared, ought to be laid before you as a homage, that of right is due. You expreſſed a deſire of a theory on that ſubject: I have therefore examined, according to the *principle of gravity*, what motions may be produced in the globe

globe of the earth by the actions of the ſun and moon, and have endeavoured to determine their preciſe quantity and laws of variation. You obſerved yourſelf, that the ſuppoſition you made uſe of, of the earth's pole moving round the periphery of a circle, whoſe center repreſented the mean place of the pole, was not exact: and in effect, as theory ſhews there are two equations ariſing from the ſun's action, and as many from the action of the moon, to be uſed in ſettling the true place of the pole, the ſimple motion in the circle cannot anſwer accurately to the compoſition of theſe ſeveral motions; and it is from thence proceeded that ſurprizing difference you found betwixt the polar diſtances calculated on that ſuppoſition, and thoſe obſerved, in the ſtar α *Caſſiopea*, in the year 1738, and in η *urſæ majoris* in the year 1740 and 1741; which diſtances, if computed from the theory, as here laid down, agree with the obſervations as nearly as the others. This appears in the tables that are added of theſe computations. You alſo inſinuated it would be proper to examine, whether the poſition of the moon's apogee had not a ſhare of influence in theſe apparent motions of the ſtars. I therefore conſidered that point, but found, as you will ſee in the fifth propoſition, that the diminution of the moon's action in the higher part of its orbit is ſo compenſated by the increaſe of the ſame action in the lower part, that in the whole revolution of the moon no alteration ariſes, whatever be the ſituation of the nodes.

The ſecond eſſay is a Theory of the Irregularities, that may be occaſioned in the annual Motion of the Earth by the Actions of Jupiter and Saturn. I was

led into this reſearch by reflecting upon that queſtion, debated among the aſtronomers for ſo many ages paſt, whether the mean inclination of the two planes of the ecliptic and equator ſuffers any change or remains invariable. Conſidering then what cauſe could produce a change in this inclination, I eaſily conceived, that if the action of Jupiter had ſufficient power to alter the plane of the earth's orbit, with reſpect to its own, by making their common interſection recede, in the ſame manner as the ſun's action operates on the lunar orbit, an alteration in the obliquity of the ecliptic would neceſſarily follow; and upon cloſer examination it appeared, that Jupiter really cauſed the earth to deviate in its courſe, and gave a retrograde motion to the line of interſection of their orbits; and further, that according to the preſent ſituation of that line, its regreſs was ſuch, as to have occaſioned a gradual diminution in the obliquity of the ecliptic for many ages paſt: by which means that queſtion ſeems decided. The reaſon, why the aſtronomers have not hitherto been able to ſettle that point, is, becauſe this variation proceeds at ſo ſlow a rate, that the obſervations of the ancients are not ſufficiently exact to aſcertain the ſmall diminution, that has happened ſince their time. I have endeavoured to fix the laws, quantity and period of this variation. From the ſame cauſe are alſo computed a progreſſive motion occaſioned in the earth's aphely, and a ſmall regreſſive one in the equinoctial points: in all which is added the little ſhare of influence, that belongs to Saturn. In the laſt propoſition are deduced ſome inequalities, that occur in certain elements of the earth's theory, that have hitherto been

ſuppoſed

ſuppoſed invariable. Theſe, as they are very ſmall, I have only added in that view, that you, who know the beſt what degree of preciſion may be expected from aſtronomical obſervations, may judge whether they are worth notice or not.

I muſt obſerve, that ſome of the points of theſe two treatiſes have been conſidered by others; and if my concluſions any where differ from them, I leave it to other geometricians to decide which are right. All I ſhall ſay on that head is, that my reſult agrees with the computation of the great Sir Iſaac Newton. As to the method, I have rather choſen to deduce the propoſitions by geometrical reaſoning, after the manner of Sir Iſaac Newton; which in reſearches of this kind always appeared to me much more ſimple, more rational, and more elegant, than the long calculus of an intricate analyſis. Beſides, if in the application there ſlips any error, it is more eaſily diſcovered in the firſt method.

As a lover of the ſciences, I ſhould be glad to contribute to their improvement; but, whether what is here offered may be reputed a ſtep that way, is left intirely to your determination. I am, with the greateſt reſpect,

Reverend Sir,

Your moſt obedient

humble ſervant,

Charles Walmeſley.

Rome, Dec. 3. 1756.

De Præceſſione Æquinoctiorum et axis Terræ Nutatione.

Lemma I.

INvenire vim, quâ Sol agit in partes Æquatorias Terræ.

Eſto T (Fig. 1.) centrum Terræ, B polus, AT recta jungens centra terræ et ſolis, ASQ circulus centro T deſcriptus et perpendicularis Æquatori quem exhibit linea TS, et TQ linea interſectionis circuli $TASQ$ et plani plano Eclipticæ perpendicularis: per punctum Æquatoris S ducatur SM parallela rectæ AT occurrens TQ in M, et producatur ad P ut ſit $SP = 3SM$, et ex P agatur PN perpendicularis in planum Æquatoris TS. Tum ob ſimilitudinem triangulorum STM, SPN, erit $ST.\ MT :: SP$ ſive $3SM.\ PN = \frac{3SM \times MT}{ST}$. Sed notum eſt, quod, ſi radius terræ ST exhibeat vim, quâ ſol deprimit particulam S verſus centrum T, $3SM$ exhibebit vim, quâ eamdem particulam retrahit à plano, quod eſt plano Eclipticæ perpendiculare, adeòque $\frac{3SM \times MT}{ST}$ exhibebit vim PN, quâ perturbatur ſitus plani Æquatoris, et efficacia hujus vis ad convertendum Æquatorem eſt ut $PN \times ST$, id eſt, ut ipſa vis PN. Vis autem ST eſt ad vim, quâ Terra retinetur in orbe ſuo circa ſolem, ut ſemidiameter terræ ST ad diſtantiam terræ à ſole, et vis, quâ terra retinetur in orbe ſuo eſt, ad vim centrifugam in terræ æquatore in ratione compoſitâ ex ratione directâ diſtantiæ terræ à ſole ad ſemidiametrum terræ et ratione inverſâ duplicata

plicatâ temporis periodici terræ circa ſolem ad ejuſdem tempus periodicum circa axem ſuum : unde per compoſitionem rationum, ſcribendo S pro periodo terræ annuà et $\mathcal{T}$ pro periodo diurna, prodit vis PN ad vim centrifugam in terræ Æquatore ut $\frac{3SM \times M\mathcal{T}}{\overline{S\mathcal{T}}^2} \times \frac{\mathcal{T}\mathcal{T}}{SS}$ ad 1. Patet autem vis PN conatum hunc eſſe, ut convertat æquatorem circum axem plano $\mathcal{T}AS\mathcal{Q}B$ perpendicularem, id eſt, circum axem qui jacet in communi ſectione æquatoris et plani $\mathcal{Q}\mathcal{T}$ Eclipticæ perpendicularis.

Ad æquales à puncto S in circumferentiâ æquatoris diſtantias ſumantur puncta duo F, et quia horum utriuſque vis conatur æquatorem convertere circum axem plano $\mathcal{T}FB$ reſpectivé perpendicularem, conatus ex utraque vi compoſitus concurret cum vi prædictâ PN ad convertendum æquatorem eique inhærentem terram circum axem plano $\mathcal{T}AS\mathcal{Q}$ perpendicularem. Ducantur autem rectæ FG perpendiculares in planum $\mathcal{Q}\mathcal{T}$ eclipticæ perpendiculare, et ſumma virium, quibus iſtæ duæ particulæ fugiunt planum æquatoris, erit $\frac{6FG \times \mathcal{T}G}{F\mathcal{T}}$, ut patet ex dictis, cujus pars, quæ conſpirat cum prædictâ vi PN, cùm ſit ad $\frac{6FG \times \mathcal{T}G}{F\mathcal{T}}$ ut $F\mathcal{T}$ ad $S\mathcal{T}$, erit $\frac{6FG \times \mathcal{T}G}{S\mathcal{T}}$ (reliquis harum virium partibus utpoté oppoſitis ſe mutuò deſtruentibus) ſive ob ſimilitudinem triangulorum $FG\mathcal{T}$ et $SM\mathcal{T}$, hæc ſumma erit ad vim PN ut $2\overline{F\mathcal{T}}^2$ ad $\overline{S\mathcal{T}}^2$; proindeque, cum ſumma omnium $\overline{F\mathcal{T}}^2$ per totam circumferentiam ſit ſubdupla ſummæ totidem $\overline{S\mathcal{T}}^2$, erit ſumma actionum omnium

nium per circuitum æquatoris ſubdupla ſummæ totidem actionum in particulam S : quamobrem vis ea, quâ perturbatur ſitus circuli æquatoris, ex viribus punctorum omnium circumferentiam æquatoris conſtituentium collecta, eſt ad vim centrifugam in eodem æquatore, ponendo radium terræ $ST=1$, ut $\frac{3SM\times MT}{2}\times\frac{TT}{SS}$ ad 1. *Q. E. I.*

Lemma II.

Vis particularum omnium extra terræ globum interiorem, cujus ſcilicet diameter eſt terræ axis minor, undique ſitarum ad terram circum axem prædictum rotandam eſt ad vim particularum totidem in circuitu circuli æquatoris uniformiter in morem annuli diſpoſitarum ad terram circa eumdem axem movendam ut 2 ad 5. Luculenter demonſtratur apud *Newtonum*.

Lemma III.

Rationem motûs terræ totius ad motum materiæ ſupra globum terræ interiorem ſtratæ determinare.

Exhibeat C centrum terræ, (Fig. 2.) CK portionem diametri cujuſvis æquatoris, $EDGK$ ſectionem terræ diametro CK et plano æquatoris perpendicularem ; ſectio hæc et ſectiones omnes huic parallelæ ellipſes ſunt ut notum eſt, et ſibi ſimiles. Ex centro K ellipſeos EDG ducatur in plano æquatoris radius KE, eritque ellipſeos ſemiaxis major, et radius huic perpendicularis KD ſemiaxis minor ; ducantur item radii alii duo KM, Km ſibi proximi, et centro K et radio KD deſcribatur circulus DHe ſecans Km, KM, KE, in h, H, e ; et radio quolibet

Kr deſcribatur arcus rn ſecans KM, Km, in r, n, et arcus st arcui rn proximus ſecans KM, Km, in s, t. Jam quoniam areola $rstn$, dum terra revolvitur circa axem CK, fertur velocitate diſtantiæ Kr proportionali, motus ejus proportionalis erit $Kr \times rs \times st$ ſive $\frac{\overline{Kr}^2 \times Hb \times rs}{KH}$; unde motus areæ totius KMm proportionalis erit $\frac{\overline{KM}^3 \times Hb}{3KH}$. Agatur HV perpendicularis in KD, et ſi ſemiaxis major KE parùm excedere ſupponatur ſemiaxem minorem KD, erit $HM = \frac{\overline{HV}^2 \times Ee}{\overline{KH}^2}$ quam proximè, adeoque $\frac{\overline{KM}^3 \times Hb}{3KH} = \frac{\overline{KH}^2 \times Hb}{3} + \frac{\overline{HV}^2 \times Hb \times Ee}{KH}$, ac proinde ſumma motuum arcarum omnium KMm, id eſt, motus totius ſectionis erit proportionalis circumferentiæ DHD ductæ in $\frac{\overline{KH}^2}{3} + \frac{KH \times Ee}{2}$. Sit autem CA æqualis ſemidiametro terræ majori, CB ſemidiametro minori, et AB ſemidiametrorum differentiæ; ſit Kk particula quàm minima axis CK, et C denotet circumferentiam æquatoris; tùm, quia eſt $KH. KE :: CB. CA$, et $Ee. AB :: KE. CA$, erit motus portionis ſphæroidicæ, cujus craſſities eſt Kk, duabus ſectionibus parallelis terminatæ, hoc eſt, circumferentia

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DHD ducta in $Kk \times \frac{\overline{KH}^2}{3} + \frac{KH \times Ee}{2}$ proportionalis quantitati $\frac{C \times \overline{CB}^3 \times \overline{KE}^3 \times Kk}{3\overline{CA}^4} + \frac{C \times \overline{CB}^2 \times \overline{KE}^3 \times AB \times Kk}{2\overline{CA}^4}$, adeòque ſumma horum motuum ſive motus totius

tius ſphæroidis circum axem CK exponetur per $\frac{CC \times \overline{CB}^3}{16CA} + \frac{3CC \times \overline{CB}^2 \times AB}{32CA}$ vel, ſi D deſignet circumferentiam radio CB deſcriptam, per $\frac{DD \times CA \times CB}{16} + \frac{3DD \times CA \times AB}{32}$. Hincque motus globi interioris, cujus radius eſt CB, exponetur per $\frac{DD \times \overline{CB}^2}{16}$: adeòque eſt motus globi interioris ad motum terræ totius circum axem CK gyrantis ut $\overline{CB}^2$ ad $CA \times CB + \frac{CA \times 3AB}{2}$ ſive ut $CA - 2AB$ ad $CA + \frac{AB}{2}$ quamproximé, et motus materiæ globo terræ interiori incumbentis ad motum terræ totius ut $5AB$ ad $2CA$ quamproximé. *Q. E. I.*

Coroll.

Eadem ratiocinandi methodo, ſi circumferentia circuli radio CB deſcripti revolatur circa diametrum propriam, cum motus cujuſvis puncti circumferentiæ ſit ut ipſius diſtantia ab hac diametro, motus totius circumferentiæ exponetur per $4\overline{CB}^2$: unde, ſi loco circumferentiæ ſubſtituatur annulus tenuiſſimus, erit motus annuli ad motum globi cujus ſemidiameter eſt CB, ut $4\overline{CB}^2$ ad $\frac{DD \times \overline{CB}^2}{16}$; hoc eſt, in ratione compoſita, ex ratione materiæ in annulo ad materiam in globo, et ratione duorum quadratorum ex diametro ad tria quadrata ex arcu quadrantali circuli, quemadmodum demonſtravit *Newtonus*. Atque hoc pacto ſi ſemidiameter terræ minor ſit ad majorem ut 229 ad 230, et tota materia ſupra globum terræ interiorem

interiorem diffuſa coaleſcere intelligatur, uti ſupponit *Newtonus*, in annulum uniformem, qui æquatorem cingat, erit motus annuli ad motum globi interioris ut 4590 ad 485223, et motus annuli ad motum terræ totius ut 4590 ad 489813.

Hîc autem advertere liceat proportionem hanc motuum, quæ nempe derivatur ex hypotheſi, quod tota materia globo terræ interiore ſuperior in annulum circum æquatorem coaleſcat, à verâ paululum aberrare: patet enim ſingulas materiæ particulas in locis ſuis conſiſtentes non ipſum eundem concipere motum ex terræ rotatione, quem ſortirentur, ſi juxta hypotheſim illam in æquatore ſimul collectæ ſubſiſterent. Differentiam illam motuum, quia minuta eſt, in inveſtigatione præceſſionis mediæ æquinoctiorum, ut minùs conſideratione dignam, omiſit *Newtonus*. At quoniam nunc temporis, ob nova Aſtronomiæ inventa, accuratius inquiritur proportio virium Solis et Lunæ, earumdemque effectus proprii, differentiæ iſtius habere rationem operæ pretium videtur, atque ea propter lemma hoc ſubjunximus et in propoſitione ſequenti uſurpabimus.

Propositio I. Problema.

Inveſtigare Præceſſionem mediam Æquinoctiorum vi ſolis genitam. Deſignet $SP\mathcal{Q}$, (Fig. 3.) Æquatorem terræ, ARL Eclipticam, $\mathcal{T}L$ lineam interſectionis planorum æquatoris et eclipticæ PM perpendiculum demiſſum ex puncto æquatoris P in planum $\mathcal{Q}\mathcal{T}$ quod ſupponitur eclipticæ perpendiculare. Sumpto arcu quam minimo æquatoris $P\phi$, ſit PN duplum ſpatii, quod corpus percurrere poſſet perpendiculariter ad æquatorem, impellente vi in lemmate 1°. definitâ, quo tempore punctum ϕ cum æquatore revol-

vens deſcribit arcum $p P$, atque hoc pacto poſt illam particulam temporis planum æquatoris tranſlatum reperietur in ſitum $\mathcal{T} N p n$, ac jam eclipticam ſecabit in n, eritque arcus $L n$ receſſus interſectionis æquatoris et eclipticæ ſive præceſſio æquinoctiorum. In $N p n$ demittatur perpendiculum $L r$, et in $\mathcal{T} L$ perpendiculum $P I$, et cum lineæ $P N$, $L r$, ſint ut ſinus arcuum $P p$, $P L$, erit $P p . P N :: P I . L r$, et ſcribendo B pro ſinu et C pro coſinu inclinationis eclipticæ ad æquatorem ad radium 1, in triangulo rectangulo $L r n$ habetur $B . 1 :: L r . L n$, adeoque fit $P p \times B . P N :: P I . L n$, et $L n = \frac{P N \times P I}{B \times P p}$: dato igitur arcu $P p$, eſt $L n$ ut $P N \times P I$. Centro $\mathcal{T}$ deſcribatur arcus circuli $R P$ perpendicularis in æquatorem $L P$, eritque in triangulo ſphærico $L R P$ tangens anguli $R L P$. inclinationis ſcilicet eclipticæ ad æquatorem, ad tangentem arcûs $R P$, id eſt, erit $\frac{B}{C}$ ad $\frac{M \mathcal{T}}{P M}$, ut radius I. ad $P I$ ſinum arcûs $P L$, unde erit $P I = \frac{C \times M \mathcal{T}}{B \times P M}$. Item in eodem triangulo eſt B ad 1 ut $M \mathcal{T}$ ad $R H$ ſinum arcûs eclipticæ $R L$, hoc eſt, $M \mathcal{T} = B \times R H$. Inſuper eſt $P N$ ut $P M \times M \mathcal{T}$ ex lem: 1°; quarè eſt $P N \times P I$ adeòque et $L n$ ut $\overline{R H}^2$, hoc eſt præceſſio horaria æquinoctiorum vi ſolis genita eſt in duplicatâ ratione ſinûs diſtantiæ ſolis ab Æquinoctio. Et quoniam ſumma omnium $\overline{R H}^2$, quo tempore ſol periodum ſuam abſolvit, eſt dimidium ſummæ totidem $\overline{\mathcal{T} R}^2$, ideò præceſſio annua æquinoctiorum eſt ſubdupla ejus, quam ſol in quadraturis Æquinoctiorum, hoc eſt, in ſolſtitiis ſemper manens eodem tempore generare poſſet.

Sit

Sit igitur ſol in Coluro Solſtitiali, eruntque LP et LR (Fig. 4.) quadrantes circuli, et Lr menſura anguli Lpn ſive PpN; hincque in triangulo Lrn eſt Ln ſive præceſſio horaria æquinoctiorum in hoc caſu ad Lr ſive ad angulum Ppn ut 1 ad B: eſt autem angulus PpN, ducto perpendiculo ps in radium TP, ad duplum angulum Pps, id eſt, ad angulum PTp qui eſt motus horarius terræ circa axem ſuum ut vis quæ agit ſecundum PN ad vim centrifugam in æquatore, hoc eſt, per lemma 1, ut $\frac{3SM \times MT}{2} + \frac{TT}{SS}$ Fig. 1. ad 1; ſive quia eſt in hoc caſu $MT = B$, et $SM = C$; ut $\frac{3B \times C}{2} \times \frac{TT}{SS}$ ad 1; eſtque motus horarius terræ circa axem ſuum ad motum horarium ſolis ut S ad T: unde conjunctis rationibus eſt præceſſio horaria Æquinoctiorum ad motum horarium ſolis ut $\frac{3C}{2} \times \frac{T}{S}$ ad 1, et in eadem ratione eſt præceſſio annua ad motum ſolis annuum.

Præceſſio igitur annua Æquinoctiorum, in hypotheſio quod ſol toto eo tempore ſtaret immotus in ſolſtitio, foret $\frac{3C}{2} \times \frac{T}{S} \times 360°$, et vera præceſſio annua foret hujus ſubdupla. Sed quia Sol agit non tantum in circulum æquatoris, ut in hac propoſitione hucuſque ſuppoſuimus, ſed in totam materiam ſupra globum terræ interiorem ſparſam, et globus ipſe motum hac vi genitum participare debet, ideò minuenda eſt præceſſio in ratione compoſitâ, ex ratione 2 ad 5 per lemma 2, et ex ratione $5AB$ ad $2CA$ per lemma 3; quarè præceſſio annua Æquinoctiorum à vi ſolis oriunda tandem prodit $\frac{3C}{4} \times \frac{T}{S} \times \frac{2}{5} \times \frac{5AB}{2CA}$

$4 \times 2 \qquad \times 360°$

$\times 360^\circ = \frac{3C}{4} \times \frac{T}{S} \times \frac{AB}{CA} \times 360^\circ$.

Sit igitur diameter terræ major ad minorem ut 230 ad 229, eritque $\frac{AB}{CA} = \frac{1}{230}$, et, exiſtente inclinatione Eclipticæ ad Æquatorem $23^\circ. 28'. 30''$. præceſſio æquinoctiorum annua vi ſolis prodit $10'',583$. Sit ratio 178 ad 177 illa terræ diametrorum, qualem ex recentioribus quidam derivarunt obſervationibus, eritque $\frac{AB}{CA} = \frac{1}{178}$, et præceſſio æquinoctiorum annua $13'',675$.

Si motûs communicatio inter globum terræ interiorem et materiam exteriorem fiat ſecundum hypotheſim *Newtonianam*, quemadmodum expoſitum eſt in Coroll. lem 3, et diameter terræ major fuerit ad minorem ut 230 ad 229, annua æquinoctiorum præceſſio ex vi ſolis erit $\frac{3C}{4} \times \frac{T}{S} \times \frac{2 \times 4590}{5 \times 489813} \times 360 = 9'',124$ $= 9''. 7'''. 26^{iv}$. Et ſi inclinatio Eclipticæ ad æquatorem ſupponatur eſſe $23^\circ \frac{1}{2}$, præceſſio illa evadit $9''. 7'''. 20^{iv}$, uti invenit *Newtonus*. *Q. E. I.*

Coroll. I.

Ponatur cum *Ill. Bradleio* Præceſſio annua Æquinoctiorum mediocris tota æqualis $50'',3$; atque ex eâ auferantur $10'',583$ et remanebunt $39'',717$ pro præceſſione annuâ mediocri â vi lunæ oriundâ, eritque vis lunæ ad vim ſolis ut 3,753 ad 1, in hypotheſi, quod ratio diametrorum terræ ſit $\frac{230}{229}$; ſi verò hæc ratio ſtatuatur æqualis $\frac{178}{177}$: terrâ manente uniformiter densâ, ex $50'',3$ auferantur $13''675$, eritque præceſſio

præceſſio annua vi lunæ genita 36″,625, et vis lunæ ad vim ſolis ut 2,678 ad 1.

Coroll. II.

Sumatur jam in Eclipticâ arcus Rq (Fig. 3.) quem ſol dato tempore quam minimo, v. g. horæ ſpatio, deſcribit, et ductâ qh parallelâ rectæ RH, quia eſt ex dictis in propoſitione præceſſio Æquinoctiorum horaria, exiſtente ſole in loco quovis R, ad præceſſionem mediocrem horariam ut $\overline{RH}^2$ ad $\frac{\overline{TR}^2}{2}$ ſive, cum ſit $RH.\ TR :: Hh.\ Rq$, ut $RH \times Hb$ ad $\frac{TR \times Rq}{2}$, erit præceſſio vera ad præceſſionem mediam, quo tempore ſol deſcribit arcum LR, ut ſpatium LRH ad ſectorem LTR, et differentia earum ad præceſſionem mediam ut triangulum TRH ad ſectorem LTR: ideòque, exiſtente $LR = 45°$, id eſt, in Octantibus Æquinoctiorum cum ſole hæc differentia ſive æquatio, quæ tunc maxima evadit (ſcribendo D pro circumferentiâ circuli cujus radius eſt 1) eſt æqualis $\frac{10'',583}{2D}$ vel $\frac{13'',675}{2D}$, unde emergit Theorema ſequens: *Eſt motus ſolis ad motum Æquinoctiorum vi ſolis genitum, ut radius ad ſinum duplæ æquationis æquinoctiorum maximæ.* Hoc pacto in priori caſu prodit æquatio maxima 51‴, in poſteriori 1″. 5‴. In aliis locis hæc æquatio eſt ad æquationem maximam ut ſinus duplæ diſtantiæ ſolis ab Æquinoctio vel Solſtitio proximo ad radium, ut patet: et additur motui medio ubi ſol tranſit à Solſtitiis ad Æquinoctia, et ſubducitur ubi ſol pergit ab Æquinoctiis ad Solſtitia.

Coroll.

Coroll. III.

Ex propoſitione generatim ſequitur regreſſum horarium mediocrem lineæ interſectionis planorum Æquatoris Terreſtris et Orbitæ planetæ cujuſcumque circa terram revolventis eſſe ut vis illius planetæ in globum terraqueum, cæteris manentibus, et coſinus inclinationis ejus orbitæ ad terræ æquatorem, conjunctim.

Propositio II. Problema.

Invenire inæqualitatem Præceſſionis Æquinoctiorum, quæ pendet à vario ſitu Nodorum Lunæ.

Sunto *SLD* (Fig. 5.) Æquator, *EAFL* Ecliptica ſecans Æquatorem in *L*, *E* Æquinoctium vernum, *L* autumnale, *GFD* orbis lunæ ſecans æquatorem in *D* et eclipticam in *F*, *AGS* circulus maximus perpendicularis in Æquatorem, et ſunto *SD*, *GD* quadrantes circuli. Dum Nodus *F* deſcribit arcum horarium eclipticæ *Ff*, vi lunæ transferatur interſectio *D* per arcum *Dd*, et deſcribatur circulus *Sd* exhibens ſitum æquatoris poſt horam elapſam, ſecetque Eclipticam in *n*, et ducantur in æquatorem perpendicula *Dg*, *Lr*. Eſto *b* ſinus ad radium 1 et *c* coſinus inclinationis, eo tempore, orbis lunaris ad terræ æquatorem; exiſtente, ut prius, *B* ſinu et *C* coſinu inclinationis Eclipticæ ſive inclinationis mediocris orbitæ lunaris ad Æquatorem: Eritque (per Coroll. 3. prop. præced.) regreſſus horarius mediocris interſectionis planorum Æquatoris et Eclipticæ vi lunæ genitus ad *Dd*, regreſſum ſcilicet mediocrem horarium interſectionis planorum Æquatoris et orbitæ

bitæ lunaris, ut C ad c; eſt autem Ff ad regreſſum prædictum interſectionis planorum Æquatoris et Eclipticæ ut motus medius nodorum lunarium ad motum medium Æquinoctiorum vi lunæ genitum, quam rationem pono eſſe K ad 1; eſt ergo $Ff. Dd :: C \times K. c$; ſed eſt $Dd. Dg :: 1. b$, et $Dg. Lr :: 1$ ad ſinum arcûs LS quem voco k, eſtque $Lr. Ln :: B. 1$; under per compoſitionem rationum fit $Ff. Ln :: B \times C \times K. b \times c \times k$.

Per nodum F deſcribatur arcus circuli maximi FC perpendicularis in SL, et ex principiis Trigonometriæ Sphæricæ eſt Coſ. FL ad radium 1 ut Cotang. FLC ad Tang. LFC; deinde eſt Sin. LFC ad Sin. DFC ut Coſ. FLC ad Coſ. FDC: cum autem angulus DFC ſit ſumma angulorum DFL et LFC, eſt Sin. $DFC =$ Sin. $DFL \times$ Coſ. $LFC +$ Coſ. $DFL \times$ Sin. LFC. Quo pacto, ſcriptis p pro ſinu et q pro coſinu anguli DFL, inclinationis nimirum mediocris orbitæ lunaris ad Eclipticam, et v pro ſinu et u pro coſinu arcûs EF, diſtantiæ ſcilicet nodi ab Æquinoctio verno, habebitur Coſ. $FDL = c = Cq + Bpu$. Item in triangulo FDL eſt $b : p :: v :$ Sin. DL, adeòque eſt coſinus arcûs DL ſive ſinus arcûs LS, hoc eſt, $k = \frac{1}{b}\sqrt{b^2 - p^2v^2} = \frac{1}{b} \times \overline{Bq - Cpu}$.

Hinc ergo obtinetur $b \times c \times k = \overline{Cq + Bpu} \times \overline{Bq - Cpu}$ $= BCq^2 - \overline{C^2 - B^2} \times pqu - BCp^2u^2$, ſed ſcribi poteſt 1 pro q et rejici terminus BCp^2u^2 ob exiguitatem p ſinûs ſcilicet anguli $5^\circ. 8' \frac{1}{2}$. Quaré eſt Ln ad Ff ut $BC - \overline{C^2 - B^2} \times pu$ ad $B \times C \times K$, et ſumma motuum Ln ad ſummam motuum Ff, quo tempore nodus F deſcribit arcum EF, ut ſumma quantitatum

titatum $BC - \overline{C^2 - B^2} \times pu$ ad ſummam totidem $B \times C \times K$, hoc eſt, ut $B \times C \times EF + \overline{C^2 - B^2} \times pv$ ad $B \times C \times K \times EF$, atque adeò quo tempore nodus tranſit ab Æquinoctio ad Solſtitium præceſſio æquinoctiorum fit $\frac{90^\circ}{K} + \frac{\overline{C^2 - B^2} \times p \times 90^\circ}{B \times C \times K \times EA}$, et quo tempore tranſit nodus ab uno Æquinoctio ad alterum, præceſſio fit $\frac{180^\circ}{K}$. Ex priori motu auferatur poſterioris dimidium et remanebit $\frac{\overline{C^2 - B^2} \times p \times 90^\circ}{B \times C \times K \times EA}$ pro differentiâ inter præceſſionem veram et mediam, id eſt, pro æquatione maximâ præceſſionis ubi nodi lunares ſcilicet verſantur in punctis ſolſtitialibus: in aliis locis patet hanc æquationem eſſe ad æquationem maximam ut ſinus diſtantiæ nodi ab Æquinoctio ad radium, et additur præceſſioni mediæ in regreſſu nodi aſcendentis ab Æquinoctio Verno ad Autumnale, et ſubducitur in ejuſdem regreſſu ab autumnali ad Æquinoctium Vernum. Notandum autem eſſe $C^2 - B^2 = 2C^2 - 1 = \text{Cof. } 2 \times 23^\circ. 28'\frac{1}{2}$, et $B \times C = \frac{1}{2} \text{ Sin. } 2 \times 23^\circ. 28'\frac{1}{2}$, ideòque $\frac{C^2 - B^2}{B \times C} = 2 \times \frac{\text{Cof.}}{\text{Sin.}} 2 \times 23^\circ. 28'\frac{1}{2} = \frac{2}{\text{Tang. } 2 \times 23^\circ. 28'\frac{1}{2}}$. Quamobrem evadit $\frac{\overline{C^2 - B^2} \times p \times 90^\circ}{BC \times K \times EA} = \frac{90^\circ \times 2 \times \text{Sin. } 5^\circ. 8'\frac{1}{2}}{K \times EA \times \text{Tang. } 2 \times 23^\circ. 28'\frac{1}{2}}$, atque hinc emergit Theorema ſequens: *Eſt tangens duplicatæ inclinationis Æquatoris ad Eclipticam ad ſinum duplicatæ inclinationis orbis lunaris ad Eclipticam ut radius ad ſinum quemdam:* tumque, *eſt motus medius nodorum ad motum medium æquinoctiorum vi lunæ genitum ut ſinus mox inventus ad ſinum æquationis Æquinoctiorum maximæ.* Loco ſinûs dupli inclinationis orbis

orbis lunaris ad Elipticam in Theoremate uſurpo propter analogiam ſinum duplicatæ ejuſdem inclinationis, cum error inde exſurgens ſit contemnendus, ut quiſque experiri facilé potèſt. Eſt autem motus nodorum lunæ annuus $19^{\circ}.20'\frac{1}{2}$, et motus Æquinoctiorum annuus vi lunæ genitus $39'',717$ ex Coroll. 1. prop. 1, exiſtente ratione diametrorum terræ æquali $\frac{230}{229}$, proindeque eſt $K=1753$. Idem Æquinoctiorum motus, exiſtente $\frac{178}{177}$ ratione diametrorum terræ, eſt $36'',625$, atque adeò $K=1901$. Unde in priori caſu prodit æquatio Æquinoctiorum maxima $19'.38'''$; in poſteriori $18''.16'''$. *Q. E. I.*

Coroll.

Ex hac propoſitione Præceſſio Æquinoctiorum vi lunæ genita pro tempore dato proportionalis eſt quantitati $b \times c \times k$ ſive $BC - \overline{C^2 - B^2} \times pu$: maxima ergo eſt ubi nodus lunæ aſcendens verſatur in principio Arietis, tunc enim eſt $u=-1$; minima autem, ubi idem nodus tranſit in ſignum libræ, ob $u=1$ eo in caſu. Unde, quoniam præceſſio annua vi lunæ genita eſt æqualis $\frac{39'',717}{B \times C} \times B \times C - \overline{C^2 - B^2} \times pu$, vel $\frac{36'',625}{B \times C} \times B \times C - \overline{C^2 - B^2} \times pu$, nullâ habitâ ratione mutationis ſitûs nodorum per id temporis factæ, differentia inter præceſſionem annuam mediocrem et maximam erit $\frac{39'',717 \times \overline{C^2 - B^2} \times p}{B \times C} = \frac{39'',717 \times 2 \times \text{Sin. } 5^{\circ}.8'\frac{1}{2}}{\text{Tang. } 2 \times 23^{\circ}.28'\frac{1}{2}}$, vel $\frac{36'',625 \times 2 \text{ Sin. } 5^{\circ}.8'\frac{1}{2}}{\text{Tang. } 2 \times 23^{\circ}.28'\frac{1}{2}}$.

Igitur, *Eſt tangens duplicatæ inclinationis Eclipticæ ad Æquatorem ad ſinum duplicatæ inclinationis Orbis lunaris*

lunaris ad Eclipticam ut præceſſio annua Æquinoctiorum mediocris vi lunæ genita ad differentiam inter præceſſionem mediocrem et maximam ſeu minimam. Unde in priori caſu eſt hæc differentia æqualis $6''.37'''$, in poſteriori $6''.6'''$, proindeque ſi tota præceſſio annua ſtatuatur $50''.20'''$, eo anno, in cujus medio circiter nodus lunæ aſcendens occupat primum gradum Arietis, præceſſio æquinoctiorum erit $56''.57'''$, vel $56''.26'''$: ubi autem nodus ſubit ſignum Libræ, præceſſio illius anni erit $43''.43'''$, vel $44''.14'''$. Et quia differentia prædicta in aliis temporibus eſt ut ſinus diſtantiæ nodi a punctis Solſtitialibus, facilè habebitur pro anno quolibet, dato nodorum ſitu.

Propositio III. Problema.

Invenire Variationem Inclinationis Eclipticæ ad Æquatorem quam generat vis Solis.

Manentibus iis quæ in propoſitione primâ dicta ſunt, producatur arcus LS (Fig. 3.) ad V ut LV ſit quadrans circuli, et dimittatur Vs perpendicularis in arcum pN productum, eritque Vs menſura Variationis horariæ inclinationis Eclipticæ ad Æquatorem. Eſt autem $Vs.Lr::TI.PI$, et $Lr.Ln::B.1$, atque per propoſitionem primam præceſſio æquinoctiorum horaria Ln eſt ad præceſſionem horariam ubi ſol verſatur in Solſtitiis quam voco U, ut $\overline{RH}^2$ ad $\overline{TR}^2$; quare conjunctis rationibus eſt $Vs.U::\frac{B\times TI\times\overline{RH}^2}{PI}.\overline{TR}^2$, ſive, ob $TR=1$, $PI=\frac{C\times RH}{PM}$, $TI=\frac{TH}{PM}$, eſt $Vs.U::\frac{C}{B}\times RH\times TH.1$; et ſumma variationem omnium horariarum Vs quo tempore ſol

ſol deſcribit arcum LR eſt ad ſummam totidem angulorum U ut ſumma omnium factorum $RH \times TH$ ducta in $\frac{B}{C}$ ad ſummam totidem quadratorum 1, id eſt, ut $\frac{\overline{RH}^2}{2} \times \frac{B}{C}$ ad arcum LR, et Variatio tota quâ minuitur inclinatio Æquatoris ad Eclipticam in progreſſu ſolis ab Æquinoctio ad Solſtitium eſt ad ſummam angulorum U (quæ tunc evadit æqualis ſemiſſi præceſſionis annuæ vi ſolis genitæ, hoc eſt, æqualis $\frac{10'',583}{2}$ vel $\frac{13'',675}{2}$) ut $\frac{B}{2C}$ ad arcum LV, ac proinde Variatio tota fit $\frac{B \times 10'',583}{C \times 4LV} = \frac{10'',583 \times \text{Tang.}23°.28'\frac{1}{2}}{4LV}$, vel $\frac{13'',675 \times \text{Tang.}23°.28'\frac{1}{2}}{4LV}$, unde naſcitur hoc Theorema: *Motus ſolis eſt ad motum æquinoctiorum vi ſolis genitum ut tangens Inclinationis mediocris Eclipticæ ad Æquatorem ad tangentem Variationis totius ejuſdem Inclinationis.* Atque hinc Variatio tota elicitur in priori caſu æqualis $44'''$, in poſteriori $57'''$, ſole ſcilicet in Solſtitiis exiſtente: in aliis locis variatio eſt, ut patet, in duplicatâ ratione ſinûs diſtantiæ ſolis ab Æquinoctio ad radium, ac propterea differentia inter ſemiſſem variationis totius et variationem genitam quo tempore ſol deſcribit arcum quemlibet LR eſt ad ſemiſſem variationis totius, ſeu ad $22'''$ vel $28'''\frac{1}{2}$, ut $2\overline{RH}^2 - 1$ ad 1, hoc eſt, ut coſinus duplæ diſtantiæ ſolis ab Æquinoctio ad radium; adeoque, dato ſolis loco, datur hæc differentia ſive æquatio, quæ addenda eſt Inclinationi mediæ Eclipticæ, ubi diſtantia ſolis ab Æquinoctio alterutro minor eſt 45 gradibus; et ubi major eſt hæc diſtantia, ſub-

ducitur. Maxima igitur eſt Inclinatio Eclipticæ ad Æquatorem, ſole verſante in Æquinoctiis; minima, ſole occupante Solſtitia. *Q. E. I.*

Propositio IV. Problema.

Variationem Inclinationis Eclipticæ, quæ pendet à vario ſitu Nodorum lunæ, determinare.

Iiſdem poſitis quæ in propoſitione ſecundâ tradita ſunt, jam ſit luna in K (Fig. 5.) et deſcribatur arcus circuli maximi KZ perpendicularis in Æquatorem DZS, et per punctum Z arcus Zd exhibens ſitum æquatoris poſt horæ ſpatium: ſecet autem Zd orbem lunæ in d, et lineas Dg, Lr, in e et q; atque ex puncto V æquatoris, exiſtente LV quadrante circuli, demittatur in arcum dZ productum perpendicularis Vt. Deſignet P motum mediocrem horarium æquinoctiorum vi lunæ genitum, atque per propoſitionem ſecundam eſt $P.Dd::C.c$; et exiſtente DS quadrante circuli, ex demonſtratis in propoſitione primâ ſequitur eſſe $2Dd:Dd::1:\overline{\text{Sin. }DK}^2$; habetur autem $Dd:De::1:b$; tum $De:Lq::\text{Sin. }DZ:\text{Sin. }LZ$, et $Lq.Vt::\text{Sin. }LZ:\text{Cof. }LZ$; unde per compoſitionem harum omnium rationum fit $2P:Vt::C\times\text{Sin. }DZ:b\times c\times\overline{\text{Sin. }DK}^2\times\text{Cof. }LZ$. Eſt autem $\text{Cof. }LZ=\text{Sin. }DL\times\text{Sin. }DZ+\text{Cof. }DL\times\text{Cof. }DZ$, hincque $2P.Vt::C:b\times c\times\overline{\text{Sin. }DK}^2\times\text{Sin. }DL+\text{Cof. }DL\times\frac{\text{Cof. }DZ}{\text{Sin. }DZ}$: ſed in triangulo ſphærico DKZ habetur $c:1::\text{Cotang. }DK$ ſive $\frac{\text{Cof. }DK}{\text{Sin. }DK}$: $\text{Cotang. }DZ$ ſive $\frac{\text{Cof. }DZ}{\text{Sin. }DZ}$; unde tandem prodit $2P$ ad Vt ut C ad $b\times c\times\text{Sin. }DL\times\overline{\text{Sin. }DK}^2+bc\,\text{Cof. }DL\times\text{Sin. }DK\times\text{Cof. }DK$. Summa igitur omnium Vt, hoc eſt, ſumma variationum

tionum omnium horariarum Inclinationis Eclipticæ tempore revolutionis lunæ genita, manente ſitu nodorum, eſt ad ſummam totidem motuum P ut ſumma omnium quantitatum $2b \times c \times$ Sin. $DL \times \overline{\text{Sin. } DK}^2 + 2b \times$ Cof. $DL \times$ Sin. $DK \times$ Cof. DK in circulo ad ſumma totidem coſinuum C, id eſt, ut $b \times c \times$ Sin. DL ad C. Poſito itaque, ut prius, motu medio nodorum ad motum medium æquinoctiorum vi lunæ genitum ut K ad 1, erit variatio mediocris horaria inclinationis Eclipticæ in menſe dato ad motum horarium mediocrem nodorum Ff, ut $b \times c \times$ Sin. DL ad $C \times K$, id eſt, ob Sin. $DL = \frac{pv}{b}$ et $c = Cq + Bpu$, ut $Cpqv + Bp^2vu$ ad $C \times K$ ſive ut pv ad K quam proximé, adeòque ſumma omnium variationum inclinationis Eclipticæ quo tempore nodus lunæ deſcribit arcum EF eſt ad motum nodi EF ut ſumma omnium pv ad ſummam totidem K, hoc eſt, ut $p \times \overline{1+u}$ ad $K \times EF$, et variatio tota quâ mutatur inclinatio Eclipticæ in regreſſu nodi ab uno Æquinoctio ad alterum, eſt ad motum nodorum 180° ut $2p$ ad $K \times EL$, quæ proinde æquatur $\frac{2p \times 180^\circ}{K \times EL}$, atque adeò per Theorema ſequens facilé prodibit: *Motus Nodorum eſt ad motum Æquinoctiorum vi lunæ genitum ut ſinus inclinationis Orbitæ lunaris Æclipticam ad ſinum ſemiſſis Variationis totius Inclinationis Eclipticæ ad Æquatorem.*

Si ratio diametrorum terræ ſit $\frac{230}{229}$, eſt motus nodorum lunæ ad motum æquinoctiorum ex prop. ut 1753 ad 1, et ut 1901 ad 1 ſi ratio terræ diametrorum ſit $\frac{178}{177}$. In priori caſu per Theorema prodit

Variatio

Variatio tota Inclinationis Eclipticæ 21″. 5‴; in caſu poſteriori 19″. 27‴: generatur autem tempore quo tranſeunt Nodi Lunares ab uno Æquinoctio ad alterum. In locis inter Æquinoctia variatio erit ad variationem totam, ex mox demonſtratis, ut $1+u$ ad 2, hoc eſt, ut ſinus verſus diſtantiæ nodi ab Æquinoctio Verno ad diametrum; vel, differentia inter ſemiſſem variationis totius et variationem pro tempore dato eſt ad ſemiſſem variationis totius, nempe ad 10″. 32‴$\frac{1}{2}$ vel 9″. 43‴$\frac{1}{2}$, ut coſinus diſtantiæ nodi ab Æquinoctio Verno ad radium: additur autem hæc differentia ſive æquatio Inclinationi mediæ Eclipticæ in regreſſu nodi à Solſtitio Æſtivali ad Solſtitium Hybernale, ac in alterâ medietate revolutionis nodi ſubducitur, ut habeatur Inclinatio Eclipticæ vera. Et maxima eſt Eclipticæ Obliquitas ubi nodus lunæ aſcendens Æquinoctium vernum ſive ingreſſum Arietis tenuerit; minima verò, cum idem nodus ad Autumnale Æquinoctium ſive ad ſignum Libræ retrorſum pervenerit. *Q. E. I.*

Propositio V. Problema.

Inæqualitates Præceſſionis Æquinoctiorum et Variationis Obliquitatis Eclipticæ, quæ pendere poſſunt ex ſitu Apogæi Lunæ, inveſtigare.

Deſcribat luna in plano Eclipticæ ellipſim *APBL* (Fig. 6.) cujus centrum ſit *C*, *T* focus quem Terra occupat, *AB* axis major, *CD* ſemiaxis minor, *TL* communis ſectio planorum Æquatoris et Eclipticæ. Eſto Luna in *P*, et ducantur *TP*, *Tp* quæ abſcindant ſectorem *TPp* motu lunæ horario deſcriptum. Centro *T* et radio ſemiaxi majori *CA* æquali deſcribatur circulus *HNO* ſecans *TP* et *Tp* in *N* et *n*, atque in *TL* demittantur perpendicula *NI*, *nm*, et

in

in TA perpendiculum NR. Si luna in circulo HNO revolvi ſupponeretur, ubi ad locum N pertingerit, præceſſio horaria æquinoctiorum vi lunæ genita foret, per demonſtrata in propoſitione primâ, ut $\overline{NI}^2$; at præceſſio illa creſcit in ratione vis quâ gignitur, et hæc vis eſt in ratione triplicatâ inversâ diſtantiæ lunæ TP, adeòque præceſſio horaria eſt ut $\frac{\overline{NI}^2}{\overline{TP}^3}$ ſive ut eadem quantitas $\frac{\overline{NI}^2}{\overline{TP}^3}$ ducta in ſectorem conſtantem TPp, hoc eſt, ut $\frac{\overline{NI}^2 \times Nn}{TP}$ ſive ut $\frac{NI \times Im}{TP}$; ſed ex naturâ ellipſeos habetur $\frac{1}{TP} = \frac{\overline{CA}^2 + TC \times TR}{CA \times \overline{CD}^2}$: unde tota præceſſio genitâ quo tempore luna in orbe ſuo revolvitur eſt ut ſumma quantitatum $NI \times Im \times \frac{\overline{CA}^2 + TC \times TR}{CA \times \overline{CD}^2}$ in circulo, ſive (quia rejici poteſt terminus ambiguus $+ \frac{TC \times TR}{CA \times \overline{CD}^2}$, utpote per alteram dimidiam circumferentia circuli partem poſitivus, per alteram dimidiam negativus) ut ſumma omnium in circulo factorum $NI \times Im$, hoc eſt, ut area ipſa circuli $HNOH$; ac proinde Præceſſio Æquinoctiorum in ſingulis lunæ revolutionibus manet eadem in quolibet Apogæi ſitu.

Variatio horaria inclinationis Eclipticæ, ſi luna exiſteret in N revolvendo in circulo HNO, foret ex demonſtratis in prop. 3. ut $NI \times TI$: ſi verò tranſferatur luna in P, eadem variatio erit ut $\frac{NI \times TI}{\overline{TP}^3}$ vel

ut

ut $\frac{NI \times TI}{\overline{TP}^3} \times TPp$, hoc eſt, ut $\frac{NI \times TI \times Nn}{TP}$ ſive, ductâ nq parallelâ TI, ut $\frac{NI \times nq}{TP}$; proindeque, ob rationem mox datam, variatio Inclinationis Eclipticæ tempore revolutionis lunæ genita eſt ut ſumma omnium in circulo factorum $NI \times nq$, id eſt, nulla.

Hinc licité colligi videtur nullam ex ſitu Apogæi Lunæ ſive in motu Æquinoctiorum ſive in Obliquitate Eclipticæ induci variationem. *Q. E. I.*

Scholium I.

Ex præcedentibus liquet Terræ Polis geminos motus competere ab utriſque ſeorſim Solis et Lunæ, quatenus extra Æquatorem revolventium, viribus oriundos; alterum plano Eclipticæ parallelum, quo puncta Æquinoctialia in antecedentia continuò retrahuntur, ac propterea ſtellæ promoveri videntur in conſequentia. Motus alter eſt ad planum Eclipticæ perpendicularis, quo Terræ Poli nutant et oſcillantur accedendo ad polos Eclipticæ et ab eis recedendo per vices, atque inde mutatur Declinatio ſtellarum. Horum motuum quantitatem directé deduximus ab exceſſu altitudinis terræ ad Æquatorem ſupra altitudinem ejus ad polos, ſecundum duplicem hypotheſim, quâ nempe exceſſus ille æſtimatur pars $\frac{1}{230}$ vel $\frac{1}{178}$ altitudinis totius, quæ hactenus eſt à Mathematicis potiſſimum uſurpata. Si verò nota præſupponatur Nutatio terræ axis, quæ quatenus actioni lunæ debita ſtatuatur æqualis $18''$, et inde quærantur motus reliqui, per propoſitiones ſupra traditas ii prodeunt, præceſſio ſcilicet æquinoctiorum annua mediocris

cris vi ſolis genita 16″. 24‴, vi lunæ 33″. 54‴, æquatio præceſſionis maxima vi ſolis 1″. 23‴, vi lunæ 16″. 45‴: Nutatio axis vi ſolis 1″. 10‴, manente nimirum terrâ uniformiter densâ.

Ut autem innoteſceret quænam ex tribus recenſitis hypotheſibus cum Phænomenis Cœleſtibus maximé conveniret, tabulas pro ſingulis confeceram et inde ſupputaveram variationes declinationis ſtellarum illarum ſex, quas exhibet *Bradleius* in Epiſtolâ ſuâ de Nutatione axis terræ in *Tranſ. Phil.* unde compertum et errores variationum computatarum intra arctiores limites contineri in hypotheſi illâ, quâ Nutatio ſtatuitur 19″. 27″ exiſtente $\frac{178}{177}$ ratione terræ diametrorum. Quapropter tabulas hujus hypotheſis proprias viſum eſt hîc tradere, per Coroll. 2. prop. 1. et prop. 2. 3. et 4. ad partem primam decimalem minuti ſecundi conſtructas.

Æquatio Æquinoctiorum Solaris.				
☉ ab ♈	Sig. O / Sig. VI.	I / VII	II / VII	Subt. / Subt.
°	//	//	//	
0	0.0	0.9	0.9	30
5	0.2	1.0	0.8	25
10	0.4	1.1	0.7	20
15	0.5	1.1	0.5	15
20	0.7	1.1	0.4	10
25	0.8	1.0	0.2	5
30	0.9	0.9	0.0	0
adde	Sig. V	IV	III	☉
adde	Sig. XI.	X	IX	ab ♈

Æquatio Æquinoctiorum Lunaris.				
☽ ☊ ab ♈	Sig. O / Sig. VI	I / VII	II / VIII	Subt. / adde
°	//	//	//	
0	0 0	9.1	15.7	30
5	1.6	10.4	16.4	25
10	3.1	11.6	17.0	20
15	4.7	12.8	17.5	15
20	6.2	13.9	17.8	10
25	7.7	14.8	18.0	5
30	9.1	15.7	18.1	0
Subt.	Sig. V	IV	III	☽ ☊
adde	Sig. XI	X	IX	ab ♈

Æquatio Obliq. Æclipticæ Solaris.				
☉	Sig. O ad.	I ad.	II ſub.	
ab ♈	Sig. VI ad.	VII. ad	VIII ſub.	
°	//	//	//	
0	0.5	0.3	0.3	30
5	0.5	0.2	0.3	25
10	0.4	0.1 adde	0.4	20
15	0.4	0.0 adde	0.4	15
20	0.4	0.1 Subt.	0.4	10
25	0.3	0.2 Subt.	0.5	5
30	0.3	0.3	0.5	0
	Sig. ♉. ad	IV ſub.	III ſub.	☉
	Sig. XI. ad	X ſub.	IX ſub.	ab ♈

Æquat. Obliq. Eclipticæ Lunar				
☽ ☊	Sig. O	I	II	adde
ab ♈	Sig. VI	VII	VIII	Subt.
°	//	//	//	
0	9.7	8.4	4.9	30
5	9.7	8.0	4.1	25
10	9.6	7.4	3.3	20
15	9.4	6.9	2.5	15
20	9.1	6.2	1.7	10
25	8.8	5.6	0.8	5
30	8.4	4.9	0.0	0
Subt.	Sig. V	IV.	III	☽ ☊
adde	Sig. XI	X	IX	ab ♈

Jam ut pateat qualis ſit Theoriæ cum Phænomenis conſenſus, ſubjiciemus computationes variationum ſtellarum ſex prædictarum ex tabulis præcedentibus derivatas. Quam obtinent formam hujuſmodi tabulæ apud *Bradleium*, eamdem hic retinent, et quidem columnæ, prima ſecunda et quarta eædem ſunt; Prima nempe indicat tempora Obſervationum, Secunda diſtantias ſtellarum à puncto in Sectore determinato menſuratas, Quarta Aberrationem lucis; Tertia autem hîc exhibet variationem declinationis cujuſque ſtellæ ortam ex præceſſione æquinoctiorum ſecundum priores duas tabulas ſuprà traditas æquatâ; Quinta exhibet variationem declinationis ortam ex Nutatione terræ axis ſive ex Æquatione Obliquitatis Eclipticæ e duabus tabulis poſterioribus excerptâ et adhibitâ ſecundum ſtellæ aſcenſionem rectam; Sexta tandem exhibet diſtantiam ſtellæ mediam ad diem 27um Martii an. 1727 à puncto ſectoris in columnâ ſecundâ notato: hæc autem diſtantia colligitur ex numeris in columnis 2^a^, 3^a^, 4^a^ et 5^a^ ſcriptis et ſecundum

cundum ſua ſigna ritè conjunctis: unde, ſi tum Obſervationes, tum æquationes motuum, eſſent omnes ad amuſſim accuratæ, omnes cujuſque ſtellæ diſtantiæ in hac columnâ expreſſæ forent ubique æquales.

γ Draconis.			Diſt. Auſt. a' 38°. 25	Var. Decl. ex Præceſ.	Aberratio Lucis	Var. Decl. ex Nutat.	Diſtantia media
			"	"	"	"	"
1727	Septemb.	3	70.5	—0.4	+19.2	—10.1	79.2
1728	Martii -	18	108.7	0.9	—19.0	8.5	79.3
	Septemb.	6	70.2	1.4	+19.3	9.1	79.0
1729	Martii -	6	108.3	1.8	—19.3	9.2	79.0
	Septemb.	8	69.4	2.3	+19.3	7.1	79.3
1730	Septemb.	8	68.0	3.2	19.3	4.3	79.8
1731	Septemb.	8	66.0	4.1	19.3	—1.1	80.1
1732	Septemb.	6	64.3	4.9	19.3	+2.0	80.7
1733	Auguſti	29	60.8	5.7	19.0	5.1	79.2
1734	Auguſti	11	62.3	6.4	16.9	7.5	80.3
1735	Septemb.	10	60.0	7.2	19.3	8.8	80.9
1736	Septemb.	9	59.3	7.9	19.3	9.2	79.9
1737	Septemb.	6	60.8	8.7	19.3	8.5	79.9
1738	Septemb.	13	62.0	9.4	19.3	6.7	78.6
1739	Septemb.	2	66.5	10.2	19.2	4.4	80.0
1740	Septemb.	5	70.8	11.0	19.6	+1.2	80.3
1741	Septemb.	2	75.4	11.8	19.2	—2.0	80.8
1742	Septemb.	5	76.7	12.6	19.3	5.2	78.2
1743	Septemb.	2	81.6	13.5	19.1	7.6	79.6
1745	Septemb.	3	86.3	15.3	19.2	10.1	80.1
1746	Septemb.	17	85.5	16.4	19.2	9.8	79.5
1747	Septemb.	2	86.1	17.2	19.2	8.4	79.7

35[a] Cassiopeæ Hevelii		Dist. Aust a′ 38° 25′	Var. Decl. ex Præcess.	Aberratio Lucis	Var. Decl. ex Nutat.	Distantia media
		″	″	″	″	″
1727	Octob. - 20	73.6	+0.9	—6.7	+9.7	77.5
1728	Januar. - 12	60.8	1.3	+6.1	9.2	77.4
	Martii - 1	57.8	1.6	+9.4	9.6	78.4
	Septemb. 26	75.2	2.5	—8.8	8.9	77.8
1729	Februar. 26	56.4	3.2	+9.4	8 2	77.2
1730	Martii - 3	57.8	4.8	9.4	5.8	77.8
1731	Februar. - 5	59.1	6.1	8.5	+2.8	76.5
1733	Januar. - 31	64.1	9.2	8.2	—3.6	77.9
1733	Decemb. 30	61.8	16.8	4.3	6.9	76.0
1739	Februar. 4	56.9	16.9	8.5	6.0	76.3
1740	Januar. - 20	56.0	18.1	7.0	—3.6	77.5
1747	Februar. 27	32.3	28.7	9.4	+9.2	79.6

α Cassiopeæ		Dist. Aust. a′ 34°. 55′	Var. Decl. ex Præcess.	Aberratio Lucis	Var. Decl. ex Nutat.	Distantia media
		″	″	″	″	″
1727	Septemb. 9	55.0	+10.2	+2.2	+1.1	68.5
1728	Septemb. 17	30.8	32.8	+4.6	1.0	69.2
1729	Junii - - 8	A 35.7	48.7	—16.3	0.7	68.8
	Decemb. 3	B 9.4	59.1	+16.5	0.6	66.8
1730	Junii - 11	A 13.8	70.3	—15.2	0.4	68.3
	Decemb. 9	B 30.8	80.7	+16.3	+0.3	66.5
1732	Januar. - 8	49.2	102.9	12.9	—0.1	66.5
1733	Januar. 21	64.8	123.1	+10.0	0.4	67.9
1734	Junii - - 13	62.8	148.5	—16.1	0.9	68.7
	Decemb. 11	105.4	157.4	+16.2	1.0	67.2
1738	Decemb. 23	176.3	229.3	+15.2	0.8	67.1
1740	Junii - - 2	169.1	255.1	—16.5	—0.3	69.9
1747	Februar. 27	332.3	400.3	+00.2	+1.0	69.1

τ Persei		Dist. Aust. a′ 38°. 20′	Var. Decl. ex Præcess.	Aberratio Lucis	Var. Decl. ex Nutat.	Distantia media
		″	″	″	″	″
1727	Septemb. 16	60.1	+8.2	—3.2	+6.3	71.4
	Decemb. 29	39.7	13.5	+12.9	5.6	71.7
1728	Decemb. 21	22.5	30.4	12.8	4.8	70.5
1729	Decemb. 2	A 9.2	46.3	11.5	3.5	70.5
1731	Januar. - 3	B 8.2	64.6	12.8	+1.6	70.8
1732	Januar. - 8	22.0	80.7	12.7	—0 4	71.0
1733	Januar. 21	34.6	96.5	11.7	2.4	71.2
1738	Decemb. 23	117.0	179.4	12.8	4.4	70 8
1740	Januar. - 22	132.5	195.3	11.7	2.3	72.2

α Persei

α Perſei	Diſt. Auſt. a 41°. 5′	Var. Decl. ex Præceſ.	Aberratio Lucis	Var. Decl. ex Nutat.	Diſtantia media
	″	″	″	″	″
1727 Decemb. 29	79.4	+12.0	+11.4	+6.5	109.3
1728 Aprilis - 7	87.5	15.7	—00.8	6.8	109.2
Julii - - 5	94.6	20.0	—11.4	6.1	109.3
Decemb. 13	65.7	26.5	+10.6	5.6	108.4
1729 Decemb. 3	53.4	41.1	9.7	4.1	108.3
1731 Januar. - 3	38.6	57.2	11.4	+1.8	109.0
1732 Januar. - 8	26.8	71.4	+11.4	—0.5	109.1
1734 Julii - 11	A 21.3	104.4	—11.4	5.7	108.6
1738 Decemb. 24	B 56.3	159.1	+11.2	5.1	108.9
1740 Januar. - 21	71.8	173.1	10.9	—2.6	109.6
1747 Februar. 27	182.5	277.6	6.6	+6.7	108.4

η Urſæ Majoris	Diſt. Auſt. a 39°. 15′	Var. Decl. ex Præceſ.	Aberratio Lucis	Var. Decl. ex Nutat.	Diſtantia media
	″	″	″	″	″
1727 Octob. 13	153.3	—11.1	+ 1.0	—4.0	139.2
1728 Januar. - 24	176.4	17.4	—17.6	3.8	137.6
Julii - 17	150.8	27.1	+17.8	3.5	138.0
Octob. - 11	170.6	31.2	+ 2.6	3.6	138.4
1729 Januar. - 16	196.6	37.2	—17.8	3.2	138.4
Julii - 21	170.4	47.4	+17.8	2.8	138.0
1730 Julii - 19	189.6	66.9	+17.8	1.7	138.8
Decemb. 28	232.4	75.3	—16.7	1.0	139.4
1731 Septemb. 18	218.1	88.4	+ 9.4	—0.4	138.7
1732 Januar. - 10	250.7	94.5	—17.7	+0.3	138.8
Aprilis 13	238.7	98.5	—00.8	0.4	139.8
1734 Julii - 11	255.7	137.8	+17.6	3.2	138.7
1735 Septemb. 10	280.8	156 5	+11.4	3.6	139.2
1736 Septemb. 8	294.7	172.6	11.6	3.8	137.5
1737 Julii - 3	303.0	186.0	17.2	3.9	138.0
1738 Junii - 29	319.0	202.0	16.8	3.3	137.0
1739 Aprilis 25	348.0	215.2	2.5	2.4	137.6
1740 Junii - 3	360.3	234.7	12.8	+1.2	139.6
1741 Septemb. 23	390.9	258.4	7.9	—0.8	139.6
1745 Septemb. 5	466.7	336.8	12.4	4.2	138.1
1746 Septemb. 20	492.0	358.8	8.8	4.1	138.7
1747 Septemb. 2	507.2	377.0	13.2	3.5	139.5

In

In hujuſmodi igitur factâ collatione ea ſanè elucet conſonantia, quâ majorem ſperari vix poſſe nemo non fatebitur ; quod utique manifeſte arguit ab Ill. *Bradleio* et ſummâ cum ſolertiâ obſervationes fuiſſe inſtitutas et mirâ perſpicaciâ veram motuum obſervatorum detectam cauſam.

Sed et ne ſciri fortè deſideraretur quanta intercedat in duabus aliis hypotheſibus Obſervationes inter et Theoriam diſcrepantia, non abs re eſſe putavimus medias ſtellarum earumdem diſtantias, quales ex Nutatione æquali 18″ et 21″. 1 proveniunt, in ſequentem tabulam congerere columnis ſextis tabularum præcedentium reſpondentem.

Stellárum diſtantiæ mediæ in hypotheſi Nutationis 18″						Stellarum diſtantiæ mediæ in hypotheſi Nutationis 21″.1					
γ Drac.	35ª. Camel.	α Caſſiop.	τ Perſei	α Perſei	η Urſæ M.	γ Drac.	35ª. Camel.	α Caſſiop.	τ Perſei	α Perſei	η Urſæ M.
″	″	″	″	″	″	″	″	″	″	″	″
79.8	76.8	68.3	71.0	108.6	139.7	78.5	78.3	68.5	72.0	110.0	138.7
79.8	76.7	68.8	71.1	108.6	137.8	78.6	78.3	69.3	72.4	110.0	137.3
79.5	77.9	68.4	69.8	108.7	138.4	78.4	79.1	69.0	71.2	110.1	137.5
79.4	77.3	66.3	69.9	107.7	139.1	78.4	78.4	67.0	71.3	109.2	137.9
79.7	76.7	67.8	70.3	107.6	138.9	78.9	77.7	68 5	71.4	109.0	137.8
80.0	77.5	65.8	70 6	108.6	138.5	79.6	78.1	66.6	71.4	109.5	137.5
80.0	76.3	66.1	71.1	108.8	139.3	80.1	76.6	66.7	71.4	109.4	138 2
80.5	78.1	67.5	71.4	108.7	139.9	81.0	77.5	68.0	70.2	108.4	138.8
78.9	76.3	68.5	72.9	109.6	139.2	79.7	75.5	68.8	71.5	108.3	138.2
79.7	76.7	67.0		110.2	139.6	81.0	75.6	67.3		109.0	138.3
80.2	77.7	67.7		107.9	140.4	81.8	77.2	67.0		109.1	139.3
79.0	79.1	70.3			138.5	80.8	80.3	69.7			138.6
79.2		68.8			139.1	80.8		69.3			139.5
78.0					137.0	79.4					137.8
79.6					140.2	80.5					138.6
80.1					136.4	80.5					137.7
80.8					137.1	80.8					138.2
78.3					138.9	77.9					140.1
80.0					139.2	79.0					140.1
80.9					138.4	79.4					137.8
80.0					139.2	79.8					138.2
80.3					140.1	79.2					139.0

Unde et id deprehenditur, loca ſtellarum in hac duplici hypotheſi determinata etiam a veris non ità multum abludere.

Supereſt ut habeatur Præceſſio Æquinoctiorum annua pro quolibet nodorum lunæ ſitu, quæ per Coroll. prop. 2. computata, exiſtente nutatione 19″. 27‴, exhibetur in tabula ſequente.

Annua Præceſſio Æquinoctiorum

☊ ab ♈	Sig. O	I	II	III	IV	V	
°	″	″	″	″	″	″	
0	56.4	55.6	53.4	50.3	47.2	45.0	30
5	56.4	55.3	52.9	49.8	46.8	44.8	25
10	56.3	55.0	52.4	49.2	46.4	44.6	20
15	56.2	54.6	51.9	48.7	46.0	44.4	15
20	56.0	54.2	51.4	48.2	45.6	44.3	10
25	55.8	53.8	50.8	47.7	45.3	44.2	5
30	55.6	53.4	50.3	47.2	45.0	44.2	0
	Sig. XI	X	IX	VIII	VII	VI	☊ ab ♈

Scholium II.

Si nulla habeatur ratio æquationum, quas in Præceſſione Æquinoctiorum et Nutatione axis terræ generat vis ſolis, conſequitur ex prop. 2. et 4. motum Poli terreſtris ſatis accurate fieri in ellipſi, cujus axis major, qui jacet in plano Coluri Solſtitiorum, eſt æqualis $19''\frac{1}{2}$ et axis minor $14\frac{1}{2}$, atque angulum deſcribere circa centrum ellipſeos æqualem motui nodi lunaris.

Fortè arguet quis hypotheſim, quam de denſitate terræ uniformi, ſimulque de ejuſdem diametrorum ratione $\frac{178}{177}$ liberé uſurpavimus, cum utrumque unà conſiſtere non poſſit. Equidem, ſi ad rerum cognitionem

tionem ſummam attingere fas eſſet, Theoriam inde perfectam evadere non diffitemur. . Sed, præterquam quòd quænam ſit accurata diametrorum ratio et conſtitutio interna globi terraquei hactenùs non conſtet, atque etiam tædio nimis eſſet omnes, qui poſſunt caſus diverſæ denſitatis excogitari, ſigillatim diſcutere; non ſequitur labefactari præcedentem theoriam, etiam ſi forté verum ſit terram non eſſe uniformiter denſam, neque proportionem diametrorum eſſe eam, quam adhibuimus. Nam, dato Æquinoctiorum motu medio à vi ſolis vel lunæ oruindo, patet ex propoſitionibus præcedentibus ritè inde determinari æquationes Præceſſionis et Nutationis, quippe quæ in quacumque denſitatis hypotheſi ſemper ſunt proportionales prædicto motui medio, et legem conſtantem ſervant. Unde, ſi vel Æquinoctiorum Præceſſionem vel axis terræ Nutationem ipſam, quæ reverâ eſt, aſſumpſimus, quantumvis ſimus de terræ configuratione hallucinati, vera omnia et firma conſiſtere videtur.

Scholium III.

Quanquam Poli Terreſtris evagationes, quâ potuimus perſpicuitate, ex ſuis cauſis deduximus ac demonſtravimus; theoriam tamen ipſam conſtructione geometricâ breviter illuſtrare non pigebit, cum unica ad eas, quæ a ſole pendent, altera ad illas, quæ à lunâ, exhibendas conſtructio ſufficiat.

In circulo LRG (Fig. 7.) cujus centrum T, ducantur radii duo TL, TR, ad ſe invicem normales, et in TR ſumpto puncto V, ità ut ſit TV ad RV ut motus ſolis medius ad motum medium æquinoctiorum vi ſolis genitum, centro T et ſemiaxibus TL, TV deſcribatur

cribatur ellipſis LVG; atque hoc pacto erit motus ſolis medius ad motum ſolis medium ab æquinoctio ut area ellipſeos ad aream circuli, $\mathcal{T}R$ ad RV ut tangens obliquitatis Eclipticæ mediocris ad tangentem variationis totius ejuſdem Obliquitatis. Et ſi exhibeat $\mathcal{T}$ terram, L punctum æquinoctiale, et in circulo ducatur radius quilibet $\mathcal{T}S$ ellipſim ſecans in P, erit motus æquinoctiorum ad motum ſolis medium, quo tempore ſol ab æquinoctio degreditur per arcum LS, ut ſpatium SLP ad ſectorem ellipticum $P\mathcal{T}L$, et RV ad SP ut tangens variationis totius obliquitatis eclipticæ ad tangentem variationis tempore prædicto factæ, ſive ut ipſa variatio prior ad variationem poſteriorem quam proximè. Item ductâ ad circulum rectâ PF parallelâ rectæ $\mathcal{T}R$, cum ſit angulus $S\mathcal{T}L$ diſtantia ſolis vera ab æquinoctio, erit angulus $F\mathcal{T}L$ diſtantia ejuſdem media, atque adeò erit angulus $F\mathcal{T}S$ æquatio motûs æquinoctiorum, et ſinus hujus anguli, ubi maximus eſt inoctantibus æquinoctiorum, eſt ad radium ut RV ad $\mathcal{T}R+\mathcal{T}V$, ex naturâ ellipſeos; in aliis locis ejuſdem æquationis ſinus, vel etiam ipſa æquatio, eſt ut ſinus duplæ diſtantiæ ſolis ab æquinoctio vel ſolſtitio quam proximè. Ut hæc demonſtrentur, motus ſolis ponatur uniformis, et recta $\mathcal{T}S$ ferri intelligatur circa centrum $\mathcal{T}$ cum ſummâ velocitatum ſolis et æquinoctii, atque in datâ temporis particulâ deſcribat ſectorem $S\mathcal{T}s$: hoc pacto ſi recta Ts ſecet ellipſim in p, et ducatur SH perpendicularis in $\mathcal{T}L$, ex naturâ hujus ellipſeos datur ſector $P\mathcal{T}p$, et areola $SPps$ eſt ut $\overline{SH}^2$, id eſt, ut quadratum ſinûs diſtantiæ ſolis ab æquinoctio, atque in eâdem ratione eſt etiam linea SP quam proximè. Conferantur hæc cum demon-

ſtratis

ſtratis in prop. 3. et in Coroll. 2. prop. 1, et patebit conſtructio. Hîc autem motum æquinoctiorum vi lunæ debitum negligo, quia parvi momenti eſt; ſin ejus habeatur ratio, pro motu medio ſolis ſubſtitui debet ſumma motûs medii ſolis et motûs medii æquinoctii vi lunæ geniti.

Jam inæqualitates eæ, quæ pendent à ſitu nodorum lunæ, ità ferè exhiberi poſſunt. Circuli EAG (Fig. 8.) radius TE dividatur in C, ità ut ſit TE ad TC ut motus nodi ab æquinoctio ad motum æquinoctii vi lunæ genitum, et ut radius ad ſinum inclinationis orbis lunaris ad Eclipticam conjunctim, atque centro C, foco T, et ſemiaxe majore $CB=TE$ deſcribatur ellipſis BAD. Tum ſi area tota circuli $EAGE$ exponat revolutionem nodi ad idem æquinoctium, area BAE ſive ADG diminuta in ratione radii ad tangentem duplicatæ inclinationis Eclipticæ ad Æquatorem exprimet æquationem nodorum maximam quamproximè, et recta BE æqualis erit ſinui æquationis maximæ Obliquitatis Eclipticæ ad radium TE. Inſuper ſi T denotet terram, E punctum æquinoctii verni, et ad locum nodi ducatur recta TP occurrens circulo in N et ellipſi in P, æquatio æquinoctiorum eo tempore ad erit æquationem maximam ut ſpatium $BPNE$ ad ſpatium BAE, et æquatio Obliquitatis Eclipticæ ad æquationem maximam ut recta PN ad rectam BE. Ubi nodus ultra Solſtitium digreſſus pervenerit in n, ducto radio Tn ſecante el ipſim in p, æquatio æquinoctiorum eo in caſu proportionalis eſt differentiæ ſpatiorum ABE, Anp, atque æquatio Obliquitatis Eclipticæ proportionalis linea np fit negativa. Cum enim perexigua ſit excentricitas TC, ex naturâ ellipſeos ſpatium ABE ſive ADG, producto ſcilicet axe majore BD

donec ſecet circulum in *G*, æquatur facto $TE \times TC$ quam proximè, et ductâ *NH* perpendiculari in *TE*, eſt ſpatium *BPNE* ut *NH* et recta *PN* ut *TH*. His igitur collatis cum iis quæ demonſtrata ſunt in prop. 2 et 4, palam fiet conſtructio.

Hîc monitum volo, quod initio fieri oportuit, per motum ſolis vel nodi medium, de quo toties eſt ſermo in propoſitionibus, intelligi debere motum ſolis vel nodi medium ab æquinoctio, id eſt, motum compoſitum ex motuum mediocrium vel ſummâ ſolis et æquinoctii, vel differentiâ nodi et æquinoctii. Quamvis enim motus ille æquinoctii tantillus ſit præ motu ſolis vel nodi, ut in computo æquationum præceſſionis æquinoctiorum vel nutationis axis terræ nullum ejus omiſſio inducat errorem ſenſibilem, hoc eò cavetur, ut accurata procedat propoſitionum demonſtratio.

Denique Orbitæ Lunaris ad Eclipticam inclinationem conſtantem ſupponere non dubitavi, licet variabilis ſit ; ſiquidem, cum variatio illa ſit paucorum minutorum, atque adeò æquationem nonniſi perexiguam hîc generare valeat, hujuſmodi minutiis Theoriam implicare atque onerare nolui.

C. Walmeſley.

De Inæqualitatibus motuum Terræ.

QUIBUS in motu ſuo Tellus noſtra ob actionem Lunæ inæqualitatibus ſubjaceat, ab aliis jam feré expenſum habetur. Quæ verò perturbationes ex viribus planetarum reliquorum oriri poſſint, quia vix quidquam delibatum reperitur, ideò viſum fuit harum inveſtigationem juxta principia *Gravitatis Newtonianæ* inſtituere. Actiones quidem Mercurii, Veneris et Martis, ob horum corporum parvitatem et vires ignotas, prætermittimus; atque adeò ad ſolas Jovis et Saturni, præſertim Jovis planetarum omnium maximi, diſquiſitio noſtra reſtringitur. Plana autem orbium horum planetarum, licèt ob mutuas actiones non penitus immota, in ſequentibus tamen tanquam immota ſupponere fas erit, cum tantilla mutatio in motum terræ vix influere poſſit.

Propositio I. Problema.

Invenire vires Jovis et Saturni ad perturbandum motum Terræ.

Eſto Sol in *S*, (Fig. 1.) Jupiter in *I*, Terra in $\mathcal{T}$ revolvens in orbe $\mathcal{T}O\mathcal{T}$; jungantur $S\,I$, $I\mathcal{T}$, $S\,\mathcal{T}$, quarum $S\,\mathcal{T}$ ſecet orbitam Lunæ $H\,L\,H$ in *L*. Tum ſimile adhibendo ratiocinium, quo à *Newtono* determinatur actio ſolis in lunam, ſi $S\,I$ exhibeat gravitatem ſolis in Jovem, $S\,\mathcal{T}$ exhibebit vim quâ Jupiter deprimit terram verſus ſolem quamproximè; gravitas autem ſolis in Jovem eſt ad gravitatem Jovis in ſolem paribus diſtantiis, ex demonſtratis apud *Newtonum*

tonum, ut 1 ad 1067, et gravitas Jovis in ſolem eſt ad gravitatem terræ in ſolem ut $\overline{ST}^2$ ad $\overline{SI}^2$: tum eſt gravitas terræ in ſolem ad vim ſolis deprimentem lunam verſus terram ut ST ad TL. Conjungantur hæ rationes, et prodibit vis Jovis deprimens terram in ſolem ad vim ſolis deprimentem lunam in terram ut $\overline{ST}^4$ ad $\overline{SI}^3 \times TL \times 1067$ quamproximè, ſive, quia ſcribendo S et I pro temporibus periodicis terræ et jovis eſt $\overline{ST}^3$. ad $\overline{SI}^3$: : SS. II, ut $SS \times ST$ ad $II \times TL \times 1067$; atque in hac ratione eſt vis Jovis ad perturbandum motum terræ ad vim ſolis quâ perturbatur motus lunæ. Datur autem vis poſterior, ergo et prior habebitur.

Quoniam eſt gravitas Saturni in ſolem ad gravitatem ſolis in Saturnum in æqualibus diſtantiis ut 3021 ad 1, loco numeri 1067 in præcedenti computo ſubſtituatur 3021 et loco revolutionis Jovis ea Saturni, atque habebitur ratio vis Saturni in terram ad vim ſolis in lunam. *Q. E. I.*

Coroll.

Quoniam errores lineares ex viribus diverſis oriundi ſunt ut vires ipſæ et quadrata temporum conjunctim, et errores angulares ut ipſi lineares applicati ad orbium radios, ſequitur errores angulares terræ annuos e ſole ſpectatos eſſe, ad errrores angulares lunæ lunæ menſtruos e terrâ ſpectatos in ratione compoſitâ, in ratione directâ virium Jovis in terram et ſolis in lunam ac duplicatâ temporum periodicorum terræ circa ſolem et lunæ circa terram conjunctim, et ex ratione inversâ radiorum ST, TL, id eſt, ſi ſcribatur L pro tempore periodico lunæ, ex ſupra demonſtratis,

ſtratis, ut S^4 ad $II \times LL \times 1067$ ſive ut 1 ad $\frac{II}{SS} \times \frac{LL}{SS} \times 1067$. Quamobrem hi errores in dato tempore, *v. g*, in certo annorum numero erunt ad ſe invicem ut 1 ad $\frac{II}{SS} \times \frac{L}{S} \times 1067$; hoc eſt, inæqualitates motûs terræ ſunt ad inæqualitates motûs lunæ in tempore dato in ratione compoſitâ, ex ratione duplicatâ temporis periodici terræ ad tempus periodicum Jovis, ex ratione ſimplici temporis periodici terræ circa ſolem ad tempus periodicum lunæ circa terram, et ex ratione gravitatis in Jovem ad gravitatem in ſolem, conjunctim. Exiſtentibus igitur temporibus periodicis, ovis Jdierum 4332,514; terræ 365,2565; lunæ 27,3215; erunt inæqualitates motûs terræ vi Jovis ad inæqulitates motûs lunæ in tempore dato in ratione 1 ad 11229,4.

Pro revolutione Jovis ponatur revolutio Saturni, dierum ſcilicet 10759,275; et pro 1067 adhibeatur numerus 3021, eruntque inæqualitates motûs terræ vi Saturni genitæ ad inæqualitates motûs lunæ in dato tempore ut 1 ad 196076,5. Et inde prodit vis ſaturni ad vim Jovis ad perturbandum motum terræ ut 1 ad 17,46.

Propositio II. Problema.

Determinare motus Nodorum et Apſidum Orbis Terreſtris.

Per motum nodorum orbis terreſtris intelligo motum lineæ interſectionis orbium terræ et Jovis vel Saturni factum in plano orbis Jovialis vel Saturnii. Motus nodorum lunæ in anno ſidereo juxta Aſtronomos eſt 19°. 20′. 32″, et hic motus ductus in 100 et dimi-

diminutus in ratione 1 ad 11229,4 per Coroll. prop. præced. fit 10′. 20‴. 5‴, qui auctus in ratione cosinûs inclinationis orbis Jovialis ad Eclipticam ad cosinum inclinationis orbis lunaris, id est, in ratione cosinûs anguli 1º. 19′. 10″ ad cosinum anguli 5º. 8′½, evadit 10′. 22″. 26‴. Hic igitur est motus nodorum terræ regressivus in plano orbis Jovialis in annis centum sideriis ex vi Jovis. Tum minuatur motus iste 10′. 22″. 26‴ in ratione 1 ad 17,46, et prodibit motus nodorum, quem eodem tempore generat vis Saturni in plano sui orbis sive etiam in plano orbis, Jovialis proximè, æqualis 35″, 39‴. Motus igitur nodorum terræ totus ex viribus conjunctis in annis centum in plano orbis Jovialis est 10′. 58″ circiter in antecedentia.

Eadem prorsus ratione colligi potest motus Aphelii terræ: erit enim et hic motus, quatenus ex vi Jovis oritur, ad motum Apogæi lunæ in dato tempore ut 1 ad 11229.4; adeoque si apogæum lunæ conficiat annuatim 40º. 40′. 43″ in consequentia, aphelium terræ conficiet annuatim 13″. 3‴. 28iv et in annis centum 21′. 44″ etiam in consequentia. Deinde imminutus hic motus in ratione 1 ad 17,46 fiet 1′. 14″½ quem generat vis Saturni; atque horum motuum summa sive totus aphelii terræ motus progressivus in annis centum evadit 22′. 58″½, et motus annuus 13″. 47‴. Hoc autem congruit cum tabulis celebrioribus Astronomicis, quæ progressum Aphelii terræ annuum vulgò exhibent plus minus 1′. 3″, hoc est, ablato motu regressivo 50″ æquinoctiorum, 13″. *Q. E. I.*

Coroll. I.

Errores lineares planetarum Jove inferiorum erunt in ſingulis eorum revolutionibus proximè ut vires Jovis in eos exercitæ et quadrata temporum revolutionum conjunctim; et quia plana horum orbium à ſe invicem et à plano orbis Jovis parum divergunt, vis Jovis ad perturbandum ſingulorum motus eſt ut diſtantiæ cujuſque planetæ à ſole, unde eorum errores angulares erunt in ſingulis revolutionibus ut quadrata temporum periodicorum, ac proinde in tempore dato ut ipſa tempora periodica, ſive in ratione ſeſquiplicatâ diſtantiarum ipſorum à ſole. Quare poſito motu nodorum terræ in annis centum 10′. 22″½ ex vi Jovis in antecedentia, et 35″½ ex vi Saturni, uti ſupra definitum eſt; et exiſtente periodo Martis dierum 686,9785; Veneris 224,701; et Mercurii 87,9692; confit tabella ſequens.

Mot. Nodor. in annis 100	Ex vi Jovis	Ex vi Saturni	Mot. totus regreſſivus
Martis	19′. 30″	1′. 7″	20′. 37″
Veneris	6. 23	0. 22	6. 45
Mercurii	2. 29½	0. 8½	2. 38

Pariter ſi aphelium terræ in annis centum vi Jovis conficiat 21′. 44″ in conſequentia, et vi Saturni 1′. 14″½, habebuntur pro reliquis planetis

Mot. Aphel. in annis 100	Ex vi Jovis	Ex vi Saturni	Mot. totus progreſſivus
Martis	40′. 52″½	2′. 20″½	43′. 13″
Veneris	13. 22	0. 46	14. 8
Mercurii	5. 14	0. 18	5. 32

Newtonus quidem in ſcholio ad prop. 14. lib. 3. Phil. Nat. hos Apheliorum motus minores ſtatuit, ſed ideò quod motum Aphelii Martis, ex quo cæteros derivat, aſſumpſerit, ceu ex Obſervationibus, æqualem 33′.20″ in annis centum: verum ſuſpicor hunc Aphelii Martis motum per Obſervationes nondum accuraté compertum haberi. Quin et diſcrepantia tabularum Aſtronomicarum dubium injicit de velocitate Apheliorum et Nodorum Planetarum penè omnium non adhuc certò conſtare apud Aſtronomos. Sed hæc non ſunt hujus inſtituti.

Coroll. II.

Deſignet *IDd* (Fig. 2.) orbitam Jovis, *DE* eclipticam quæ poſt centum annos ſitum habeat *dE*, tranſlato nodo à *D* in *d*: ducto arcu *Dg* perpendiculari in *dE*, erit *Dd* ad *Dg* ut radius ad ſinum inclinationis orbis Jovialis ad eclipticam, hoc eſt, ut radius ad ſinum anguli 1°. 19′. 10″; adeoque exiſtente *Dd* = 10′.58″, ut ſupra definitum eſt, erit *Dg* = 15″.9‴. Unde ſpatio annorum centum Ecliptica mutat latitudinem ſuam (ſi ita loqui fas eſt) quantitate 15″.9‴, vel potius ſtella in communi ſectione Eclipticæ et orbitæ Jovis locata paulatim ab Eclipticâ recedere cernetur ità ut poſt centum annos ab eâ diſtabit angulo 15″.9‴, atque ità per multa ſecula ferè æqualiter augebitur hujus ſtellæ latitudo: quin et tantundem augebuntur vel minuentur latitudines ſtellarum omnium parem cum nodis Jovialibus longitudinem habentium. Hæ igitur fixæ à tempore Hipparchi, id eſt, per annos 1900 circiter, latitudinem ſuam mutarunt quinque penè minutis primis. Pariter cum

arcus omnes inter circulos *DE*, *dE*, comprehenſi ad circulum *dE* perpendiculares ſint ut ſinus diſtantiarum ipſorum à puncto *E*, ſive ut coſinus diſtantiarum ipſorum à nodo Jovis, incrementum decrementum latitudinis ſtellæ cujuſlibet erit ad 15″. 9‴ ut coſinus differentiæ longitudinum ſtellæ ipſius et nodi proximi Jovis ad radium; ac proinde, datâ ſemel longitudine tum ſtellæ tum nodorum Jovis, dabitur variatio latitudinis ſtellæ pro tempore quolibet. Ex hoc principio computavimus variationem latitudinis ſiderum pro ſingulis quinque gradibus longitudinis, qualis exurgere debeat lapſu ſeculi proximè venturi ab anno 1750 incipientis ad annum 1850 abſolvendi; in hypotheſi quod nodus Jovis aſcendens anno 1800 occupabit nonum gradum Cancri, ſicuti in tabulis Aſtronomicis ferè habetur.

Variatio Secularis latitudinis ſtellarum in parte Eclipticæ Boreali exiſtentium

Longitudo Stellar.	O. adde	O. Subt.	VI adde	VI Subt.	II adde	II Subt.	VIII adde	VIII Subt.	IV adde	IV Subt.	X adde	X Subt.
0	″	‴	″	‴	″	‴	″	‴	″	‴	″	‴
9	0.	0	13.	8	13.	8	7.	35	15.	9	7.	35
14	1.	19	13.	44	12.	25	8.	41	15.	6	6.	24
19	2.	38	14.	14	11.	36	9.	44	14.	55	5.	12
24	3.	55	14.	38	10.	43	10.	43	14.	38	3.	55
29	5.	12	14.	55	9.	44	11.	36	14.	14	2.	38

Longitudo Stellar.	I adde	I Subt.	VII adde	VII Subt.	III adde	III Subt.	IX adde	IX Subt.	V adde	V Subt.	XI adde	XI Subt.
4	6.	24	15.	6	8.	41	12.	25	13.	44	1.	1
9	7.	35	15.	9	7.	35	13.	8	13.	8	0.	0

Pro ſtellis Auſtralibus mutanda ſunt ſigna additionis et ſubtractionis.

Hîc locus eſſet conſenſum Theoriæ cum Phœnomenis oſtendere: ſed præterquam quòd id vetat inopia Obſervationum antiquorum ſatis accuraté habitarum; ineſſe ſtellis quibuſdam motum aliquem, quem diſcernere oporteret, magis notabilem advertit Ill. Bradleius, quemque à qualicumque mutatione in motu terreſtri non pendere exiſtimat. Itaque in Phœnomeni hujus elucidationem ulteriori ope ab Aſtronomis ſperandâ indigemus.

Propositio III. Problema.

Variationem Obliquitatis Eclipticæ ex viribus prædictis oriundam determinare.

Quando-

Quandoquidem ex propoſitione præcedente Ecliptica ſenſim mutat ſitum ſuum, inde generatim patet variari etiam debere inclinationem ejus ad Æquatorem: qualis autem et quanta ſit Variatio hæc ut inveſtigemus, ſit VED (Fig. 3.) Ecliptica, $\mathcal{J}D$ orbis Jovis ſecans eclipticam in D, $\mathcal{Q}L$ Æquator, et L punctum Æquinoctiale. Sunto DE et LV quadrantes circuli, et ſi per temporis particulam intelligatur nodus D transferri motu ſuo medio in d, circulus dEt deſcriptus per puncta d, E, exhibebit ſitum eclipticæ elapſo illo tempore; et ſi in eumdem demittantur perpendicula Dg, Vt, poſterius Vt exhibebit variationem obliquitatis eclipticæ eodem tempore genitam. Scripto igitur s pro ſinu inclinationis orbis Jovis ad Eclipticam, exiſtente radio 1, erit in triangulo Ddg, $Dd:Dg::1:s$; ſed eſt $Dg:Vt::1:$ Sin. EV; unde erit $Dd:Vt::1:s\times$ Sin. EV; at ob $DE=LV$, eſt $DL=EV$, adeoque fit $Dd:Vt::1:s\times$ Sin. DL, hincque patet variationem momentaneam obliquitatis Eclipticæ eſſe ut ſinus diſtantiæ nodi Jovis ab Æquinoctio.

Ducatur jam LC ad centrum ſphæræ C, et in LC perpendiculum DK; atque ob motum regreſſivum tum nodi D tum æquinoctii L, velociorem autem æquinoctii quam nodi, puncta D, L, ad ſe mutuò accedunt vel a ſe recedunt differentiâ velocitatum: fingamus igitur alterutrum *v.g.* nodum D moveri cum hac differentiâ velocitatum, ſtante æquinoctio L immoto, et eſto De arcus quam minimus hac velocitatum differentiâ deſcriptus, et in LC demiſſo perpendiculo ek, habetur $De:Kk::1:DK$ vel Sin DL, unde eſt $Dd:Vt::De:s\times Kk$, et ſumma variationum omnium Vt, quo tempore punctum D differentiâ prædictâ velocitatum deſcripſerit arcum

quem-

quemvis DH, erit ad ſummam totidem motuum nodi D, id eſt, variatio obliquitatis eclipticæ eo tempore genita erit ad motum nodi, ut ſumma omnium Kk ducta in ſinum s ad ſummam totidem arcuum De, hoc eſt, ducto in LC perpendiculo HM, ut factum $s \times KM$ ad arcum DH. Si denotaverit igitur N motum nodi Jovis, quo tempore deſcriptus fuerit arcus DH, variatio inclinationis Eclipticæ ad Æquatorem eodem tempore genita erit $\frac{N \times KM \times s.}{DH}$ Hinc-que cum $\frac{N}{DH}$ exprimat rationem motûs nodi ad differentiam motuum nodi et æquinoctii, et KM ſit differentia vel ſumma coſinuum diſtantiarum punctorum D et H ab æquinoctio, prout puncta K et M jaceant ad eaſdem vel diverſas partes centri C, naſcitur Theorema ſequens: *Eſt radius ad ſinum inclinationis orbitæ Jovis ad Eclipticam ut differentia vel ſumma coſinum diſtantiarum Nodi ab Æquinoctio in principio et fine temporis dati ad ſinum quendam*; deinde, *eſt differentia motuum Nodi et Æquinoctii ad modum nodi ut ſinus mox inventus ad ſinum Variationis Obliquitatis Eclipticæ.*

Pro nodo et inclinatione orbitæ Jovis ſubſtituantur nodus et inclinatio orbitæ Saturni, atque idem Theorema dabit variationem Obliquitatis Eclipticæ quam generat Saturnus. *Q. E. I.*

Coroll. I.

Nodus D in dictâ figurâ eſt nodus deſcendens Jovis, et L punctum Æquinoctii Verni; unde et ex ratiocinio problematis patet, quamdiu nodus D et æquinoctium L ad ſe accedunt, decreſcere inclinationem Eclipticæ ad Æquatorem; eamdem autem

 creſcere,

creſcere, ubi prædicti nodus et æquinoctium recedunt à ſe invicem: vel, quod eodem recidit, in tranſitu nodi aſcendentis orbis Jovialis ab Æquinoctio Vernali ad Autumnale ſemper minuitur Obliquitas Eclipticæ, et in tranſitu ejuſdem nodi ab Æquinoctio Autumnali ad Vernale augetur.

Coroll. II.

Si puncta *D* et *H* fuerint ſita ex diverſis partibus puncti Æquinoctialis, id eſt, ſi nodus intra tempus propoſitum tranſierit per Æquinoctium, patet ex Coroll. præced. Obliquitatem Eclipticæ partim creviſſe partim decreviſſe: quo in caſu incrementi ac decrementi differentia dabitur per Theorema ſuperius; ſed et habebitur horum ſumma ſive variatio tota Obliquitatis eo tempore genita, ſi loco differentiæ vel ſummæ coſinuum diſtantiarum nodi ab æquinoctio ſubſtituatur in Theoremate prædicto ſumma ſinuum verſorum earumdem diſtantiarum, ut ſatis patet.

Ratiocinium utriuſque Corollarii obtinet etiam pro Saturno.

Scholium I.

Cum fuerit multum diſceptatum inter Aſtronomos et veteres et recentiores de variâ vel conſtanti Eclipticæ Obliquitate, et neminem noverim, qui Phænomenon hoc juxta leges gravitatis expenderit, hac propoſitione lubuit ejus inveſtigationem pertentare.

Porrò cum nodus aſcendens Jovis nunc temporis verſatur in ſigno Cancri, patet per Coroll. 1. propoſitionis hujus à multis ſeculis ſemper decreviſſe Obliquitatem Eclipticæ. Sed ut ſpecialius hoc exponatur:

tur: Motus ſecularis nodi Jovialis ex prop. 2. eſt $10'.22''\frac{1}{2}$, et motus æquinoctii, annuo exiſtente 50″, eodem tempore eſt 1°. 23′. 20″, adeoque differentia motuum nodi et æquinoctii eſt ad motum nodi ut 7,0331 ad 1; quare tempus tranſitûs nodi ab æquinoctio verno ad autumnale, quod conſtituit terminum imminutionis Obliquitatis Eclipticæ, erit annorum 14803, ſepoſitâ acceleratione modicâ vi Saturni debitâ: exiſtente igitur nunc nodo Jovis in $8^{\circ}\frac{1}{3}$ 69, ab annis 8000 (ſi tanta ſupponatur Mundi ætas) decrevit Eclipticæ Obliquitas, ac per annos 6000 et amplius decreſcere debebit, nec niſi poſt periodum annorum 29606 priſtinum ſitum recuperabit. Tota verò imminutio, quam prædicto tempore in Obliquitate Eclipticæ generare poteſt vis Jovis, prodit per Theorema in propoſitione traditum 22′. 30″. Hæc igitur eſt variatio maxima.

Si deſideretur decrementum factum in Obliquitate Eclipticæ ſpatio annorum mille proximè elapſorum, ità facilè computabitur. Motus nodi Jovis ex prop. 2. in annis mille eſt 1°. 43′. 44″; præceſſio autem æquinoctiorum eodem tempore 13°. 53′. 20″, atque horum motuum differentia 12°. 9′. 36″; unde poſito loco nodi initio anni 1755 in 8°. 20′ Cancri juxta tabulas Aſtronomicas Cl. *Halleii*, diſtantiæ nodi ab æquinoctio initio et fine temporis dati fuerunt 93°. 49′. 36″, et 81°. 40′: indeque per Theorema præfatum prodit decrementum quæſitum ex vi Jovis 2′. 22″. 56‴. Simili modo motus nodi Saturnii ex prop. 2. in annis mille eſt $5'.56''\frac{1}{2}$; unde differentia inter motum nodi et motum æquinoctii eſt ad motum nodi ut 139,265 ad 1: diſtantiæ autem nodi ab æquinoctio initio et fine temporis dati, poſito nodo

juxta

juxta eaſdem tabulas in 21°. 21′. 36″ Cancri initio anni 1755, hac ratione forent 68°. 38′. 24″ et 82°. 25′. 48″; hincque, exiſtente inclinatione orbis Saturni ad Eclipticam 2°. 30′. 10″, per idem theorema decrementum vi Saturniâ genitum exurgit 15″. 2‴. Adeòque decrementum totum Obliquitatis Eclipticæ annis mille proximé elapſis factum ex viribus conjunctis Jovis et Saturni evadit 2′. 38″. A tempore igitur *Hipparchi* imminuta eſt Obliquitas Eclipticæ minutis circiter quincque primis.

Haud ſecùs, ſi nodus Jovis aſcendens initio anni 1750 conſtituatur in 8°. 15′. 50″ 69, et nodus Saturni in 21°. 20′. 6″ 69, prout exhibent tabulæ *Halleianæ*, computatur tabella ſequens

Ab anno ineunte	Ad annum ineuntem.	Decrem. Obliq. Ecl. vi Jovis	Decrem. Obliq. Ecl. vi Saturn.	Totum Decrem. Obliq. Eclipt.
1750	1800	- 7″. 6‴	- - 0″. 44‴	- - 7″. 50‴
1800	1900	14. 9	- - 1. 27	- - 15. 36
1900	2000	14. 5	- - 1. 26	- - 15. 31

Collatio Theoriæ cum Phænomenis.

Ut adæquata theoriæ cum phœnomenis collatio inſtitueretur, Obſervationes Veterum conſulendæ forent et cum Nuperis comparandæ; ſed illæ imperfectiores ſunt quam quæ in minutis hujuſmodi quantitatibus definiendis inſerviant. Recentiorum itaque unam et alteram, minùs adeò idoneas, afferre ſufficiat.

1°. Refert Cl. *Le Monnier* in Actis Acad. Paris, an. 1738 altitudinem centri ſolis in ſolſtitio æſtivo verſantis anno 1669 à *Picarto* Pariſiis menſuratam fuiſſe 64°. 39′. 0″, et anno 1670 64°. 38′. 58.″: mediam ſumamus 64°. 38′. 59″. Ipſemet *Le Mon-*

nier ſolis limbi ſuperioris altitudinem (uti habetur in actis ejuſdem Acad. an 1743) in ſolſtitio æſtivo anni 1743 reperit 64°. 54′. 35″, adeoque altitudinem centri ſolis 64°. 38′. 45″. Locus autem nodi aſcendentis lunæ medio *Picarti* Obſervationum tempori reſpondens erat 27°.♈ circiter, et 16°.♉ tempore ſolſtitii æſtivi anni 1743 : unde in priori caſu Nutatio axis Terreſtris erat 8″, totâ exiſtente 18″, et in poſteriori 6″. 15‴ ; atque his quantitatibus reſpectivé ablatis, altitudo ſolis prior evadit 64°. 38′. 51″, poſterior 64°. 38′. 38″. 45‴, quarum differentia 12″. 15‴ eſt decrementum factum in obliquitate mediocri Ecliptiæ intervallo annorum $73\frac{1}{2}$. Per propoſitionem noſtram decrementum vi Jovis genitum pro eodem temporis intervallo eſt 10″. 27‴, et vi Saturni 1″. 5‴ : Totum igitur decrementum Obliquitatis Ecliptiæ juxta theoriam fit 11″. 32‴.

2°. Ex Obſervationibus *Waltheri* ſolertiſſimé inter ſe comparatis colligit acutiſſimus Aſtronomus *De La Caille* (in Actis Acad. Pariſ. an. 1749) inclinationem Ecliptiæ ad Æquatorem circa annum 1496 fuiſſe 23°. 29′. 32″, quæ nunc temporis æſtimatur 23°. 28′ 30″, adeòque annis 260 decrevit Obliquitas Ecliptiæ minuto uno primo circiter. Per Theoriam noſtram decrementum illud vi Jovis foret 37″. 2‴, et vi Saturni 3″. 50‴ ; unde decrementum totum tempore prædicto evaderet 40″. 52‴ ſive 41″ circiter. Si loco tabulæ refractionum *Caſſinianæ Newtoniana* uſurparetur, Obliquitas Ecliptiæ ex Obſervationibus *Waltheri* deducta minor evaderet minutis aliquot ſecundis, adeòque ad determinationem noſtram propius accederet. Cæterum propter incertitudinem refractiorum et latitudinum locorum, ex Obſervationibus in Solſtitiis

ſtitiis Æſtivalibus eodem loco habitis Variatio Obliquitatis Eclipticæ tutiſſimè definiri videtur.

Si variatio ex Obſervationibus tandem accuratè derivata ſuperaverit, uti in exemplis allatis, variationem, quam aſſignat hæc theoria, exceſſus ille debitus erit actionibus planetarum Martis et Veneris, quæ quidem, cum amborum nodi aſcendentes intra prima ſex ſigna verſentur, ad imminuendam Obliquitatem Eclipticæ etiam conſpirant. Quapropter, ſiquando Obſervationibus accuratè poterit innoteſcere tam hæc variatio quam progreſſus Aphelii terræ, planetarum item Martis ac Veneris tum demum et vires cognoſcere et moles ponderare licebit.

Propositio IV. Problema.

Motum Æquinoctiorum cauſis prædictis debitum determinare.

Hîc non inveſtigatur motus puncti Æquinoctialis, quatenus Æquator terræ ob materiam ibi redundantem vi Jovis et Saturni mutaret ſitum ſuum reſpectu Eclipticæ, quemadmodum viribus Solis et Lunæ fieri innoteſcit; hujuſmodi enim mutatio ex actionibus Jovis vel Saturni oriunda omninò debet eſſe inſenſibilis: ſed motum illum Æquinoctii quærimus, qui oritur ex variatione, quam fieri in ſitu plani Eclipticæ ſuprà monſtravimus.

Iiſdem igitur manentibus ac in propoſitione præcedente, ex puncto m ubi Æquator ſecat circulum dE demittatur in DE perpendiculum $\underline{mn}$, et quia eſt $Dg\underline{mn} :: 1 :$ Coſ. DL ſive CK, et $Dd : Dg :: 1 : s$,

erit $Dd : mn :: 1 : s \times CK$, vel ducto radio CS perpendiculari ad CL, et ad CS rectis perpendicularibus DR, er, HG, erit $Dd : mn :: De : s \times Rr$; adeoque erit ſumma omnium mn, quo tempore differentiâ motuum Æquinoctii et Nodi deſcribitur arcus DH, ad ſummam totidem Dd ut ſumma omnium Rr ducta in s ad ſummam totidem arcuum De, hoc eſt, ut factum $s \times RG$ ad arcum DH. Igitur ſumma omnium mn, id eſt, Latitudo puncti Æquinoctialis, ut ità dicam, ſive diſtantia ejus à plano DCE ſpectato ut immoto, eſt æqualis $\frac{N \times RG \times s}{DH}$, exhibente ſcilicet N motum nodi, quo tempore deſcribitur arcus DH. Unde, cum RG æquetur differentiæ vel ſummæ ſinuum arcuum DL, HL, prout puncta R, G, jaceant ad eaſdem vel diverſas partes centri C, circulo ID exhibente orbitam vel Jovis vel Saturni, confit Theorema ſequens: *Eſt radius ad ſinum inclinationis orbitæ Jovis vel Saturni ad Eclipticam, ut differentia vel ſumma ſinuum diſtantiarum nodi ab Æquinoctio in principio et fine temporis dati ad ſinum quemdam:* deinde, *eſt differentia motuum Nodi et Æquinoctii ad motum nodi ut ſinus mox inventus ad ſinum variationis Latitudinis puncti Æquinoctialis.* Vel etiam quia variatio Obliquitatis Eclipticæ eſt ex propoſitione præcedente æqualis $\frac{N \times KM \times s}{DH}$, et variatio Latitudinis puncti Æquinoctialis æqualis $\frac{N \times RG \times s}{DH}$, habetur illud alterum Theorema: *Eſt variatio Latitudinis puncti æquinoctialis ad variationem Obliquitatis Eclipticæ ut ſumma vel differentia ſinuum diſtantiarum nodi ab æquinoctio initio et fine temporis dati ad*

ad ſummam vel differentiam coſinuum earumdem diſtantiarum.

Tum, quia eſt ſemper Ln ad mn ut coſinus inclinationis Eclipticæ ad Æquatorem ad ejuſdem inclinationis ſinum, ſive ut radius ad tangentem ejuſdem inclinationis, erit ſumma omnium Ln tempore dato, hoc eſt, variatio puncti Æquinoctialis ſecundum Longitudinem a puncto fixo in plano DCE menſuratam ad ejuſdem variationem ſecundum Latitudinem in eâdem ratione, ideoque datur. *Q. E. I.*

Coroll.

Hinc ſequitur variationem puncti Æquinoctii Verni ſecundum latitudinem à plano immoto computatam ſemper fieri Boream verſus in tranſitu nodi aſcendentis Jovialis vel Saturnii à Solſtitio Æſtivo ad Hybernum, et Auſtrum verſus ubi idem nodus tranſit a Solſtitio Hyberno ad Æſtivum. Contrarium dici debet de puncto Æquinoctii Autumnalis: variationem autem puncti Æquinoctialis ſecundum longitudinem à loco dato in plano illo immoto numeratam fieri in priori caſu contra, in poſteriori ſecundum ſeriem ſignorum; hoc eſt, in priori caſu regreditur Æquinoctium, in poſteriori progreditur.

Si puncta D et H ſita fuerint ex diverſis partibus puncti Solſtitialis, id eſt, ſi per tempus propoſitum Nodus tranſierit in ſignum Cancri vel Capricorni, Theoremata in propoſitione tradita dabunt differentiam variationum contrarium puncti æquinoctialis; ſed et ſumma ipſarum quo pacto haberi poſſit facilé patet.

Scholium

Scholium.

Quum in decurſu annorum mille proximè elapſorum nodus Jovis aſcendens ſubierit ſignum Cancri, ac propterea Variationes præfatæ non in eundem toto eo tempore factæ fuerint ſenſum, quæramus quales evaſerint per annos quingentos ab initio anni 1755 retrorſum numeratos: quo in caſu differentia motuum nodi Jovialis et æquinoctii, per ſcholium prop. præcæd extitit $6^{\circ}.\ 4'.\ 48''$; unde cætera, ut ibi, proſequendo prodit per utrumvis theorema in propoſitione hac traditum Variatio puncti æquinoctii Verni ſecundum latitudinem Boream verſus æqualis $6''.37'''$, hincque variatio ſecundum longitudinem æqualis $15''.14'''$, vi Jovis.

Addantur in priori caſu pro vi Saturni $2''.26'''$, et in poſteriori $5''.36'''$, atque evadet tota variatio puncti æquinoctialis ſecundum latitudinem annis quingentis proximè elapſis facta æqualis $9''.3'''$, et Retrogreſſio ejudem puncti $20''.50'''$. Hujuſmodi igitur Variationes nonniſi perlongo tem poris intervallo ſenſibiles fiunt.

Propositio V. Problema.

Errorum Terreſtrium æquationes inveſtigare.

Errorum angularium Æquationes maximæ, cum et ipſæ ſint errores angulares, ſunt directé ut vires et quadrata temporum, quibus generantur, conjunctim, et inversè ut orbium diametri; ideòque ſunt ut ipſi errores ſive motus, quorum ſunt æquationes, temporibus iſtis geniti: tempora autem ipſa ſunt quamproximè ut æquationum periodi. Unde ob datos motuum lunarium et terreſtrium errores, æquatio-

numque

numque periodos, ex datis errorum lunarium æquationibus per analogiam eruentur æquationes errorum terreſtrium.

Sic, periodus æquationis Apogæi lunaris et Variationis Æquationis centri lunæ cum ſit proportionalis revolutioni ſolis ad Apogæum lunæ, ac propterea ob ſimilitudinem virium ſimiliter applicatarum periodus æquationis Aphelii terræ et Variationis æquationis centri proportionalis eſſe debeat revolutioni Jovis ad terræ Aphelium, erunt æquationes iſtæ lunares ad æquationes haſce terræ ſimiles, ut motus Apogæi lunaris tempore revolutionis ſolis ad lunæ apogæum, ad motum Aphelii terræ tempore revolutionis Jovis ad ipſum terræ Aphelium, hoc eſt, exiſtente motu medio Apogæi lunaris annuo $40^{\circ}.40'.43''$ et motu annuo Aphelii terræ ſupra invento $13''.2'''.28^{iv}$, ut $45^{\circ}.51'.40''$ ad $2'.34''.42'''$. Quarè poſitâ variatione totâ æquationis maximæ centri lunæ æquali $2^{\circ}.41'\frac{1}{2}$ prout feré habetur in tabulis Aſtronomicis, erit variatio æquationis maximæ centri Terræ ſive Solis $9''.4'''$.

Denotet igitur *Æ* æquationem centri ſolis maximam mediocrem, eritque $Æ+4''.32'''$ æquatio maxima, et $Æ-4''.32'''$ æquatio minima; atque his æquationibus dabuntur etiam excentricitates congruæ.

Tum, quemadmodum variatio æquationis maximæ centri lunæ creſcit in ratione duplicatâ ſinûs diſtantiæ Apogæi lunaris à quadraturis ſuis cum ſole, ità variatio æquationis maximæ centri ſolis, id eſt, incrementum æquationis minimæ augetur in ratione duplicatâ ſinus diſtantiæ aphelii terræ a quadraturis ſuis cum Jove: ſive, variatio æquationis mediæ eſt ad ſe-

miſſem

miſſem variationis totius, nempe ad 4″. 32‴, ut coſinus duplæ diſtantiæ Jovis ab Aphelio terræ ad radium; et additur æquationi mediæ, ubi linea Apſidum Orbis magni pergit ab octantibus ſuis cum Jove ad ſyzgyias, vel a ſyzygiis ad octantes; in reliquâ parte ſubducitur. Utrum autem tantilla variatio Obſervationibus patere poſſit, Aſtronomis definiendum relinquo.

Haud ſecùs, ſi æquatio maxima apogæi lunæ ſtatuatur 12°. 18′ erit 45°. 51′. 40″ ad 2′. 34″. 42‴ ut 12°. 18′ ad æquationem maximam motûs Aphelii terræ ſive Apogæi ſolis, quæ proinde erit 41″, 30‴, ubi ſcilicet Apſides Orbis Telluris verſantur in octantibus ſuis cum Jove. In aliis poſitionibus æquatio Aphelii erit ad æquationem maximam ut ſinus duplæ diſtantiæ Jovis ab aphelio terræ ad radium; motui verò medio additur in tranſitu apſidum orbis magni a ſyzygiis ſuis cum Jove ad quadraturas, et in tranſitu a quadraturis ad ſyzygias ſubducitur, ac proinde in caſu quolibet habebitur verus Aphelii terræ ſive Apogæi ſolis locus.

Hoc pacto confecimus tabulam ſequentem, ſi forte uſui eſſe poſſit, in quâ *Æ* denotat æquationem centri ſolis maximam mediocrem.

Diſtantia Jovis ab Apogæo Solis

	O^s VI		I VII		II VIII		
Gr.	Æquatio Apog. Sol. Adde	Æquatio Centri Solis	Æquatio Apog. Sol. Adde	Æquatio Centri Solis	Æquatio Apog. Sol. Adde	Æquatio Centri Solis	Gr
	″ ‴	″ ‴	″ ‴	″ ‴	″ ‴	″ ‴	
0	0. 0	Æ+4. 32	35. 56	Æ+2 16	35. 56	Æ—2. 16	30
10	14. 11	Æ+4. 16	40. 52	Æ+0. 47	26. 40	Æ—3. 29	20
20	26. 40	Æ+3. 29	40. 52	Æ—0. 47	14. 11	Æ—4. 16	10
30	35. 56	Æ+2. 16	35. 56	Æ—2. 16	0. 0	Æ—4. 32	0
	Subtrahe		Subtrahe		Subtrahe		
	V XI		IV X		III IX		

Simili modo erit Variatio lunæ Variationem ſolis ut motus medius Apogæi lunaris tempore revolutionis lunæ ad ſolem ad motum medium Apogæi ſolaris tempore revolutionis ſolis ad Jovem; ideoque cum motus apogæi lunaris tempore ſynodico ſit 3°. 17′. 20″, et motus apogæi ſolaris ſit 14″. 15‴ quo tempore ſol ad Jovem revolvitur, poſitâ variatione maximâ lunæ 35′. 10″, prodit variatio maxima ſolis 2″. 32‴, quæ locum obtinet, ubi ſol verſatur in octantibus cum Jove; in aliis locis variatio foret ad variationem maximam ut ſinus duplæ diſtantiæ ſolis à quadraturis ſuis vel ſyzygiis cum Jove ad radium quam proximè.

Item, ſi eadem eſſet excentricitas orbium Terræ ac Jovis, foret æquatio motûs medii Terræ ſive ſolis, quæ oritur ex variâ contractione et dilatatione orbis magni per vim Jovis, ad ſimilem æquationem lunæ, ut motus apogæi ſolis tempore revolutionis Jovis ad motum apogæi lunæ tempore revolutionis ſolis, hoc eſt, ut 2′. 34″. 41‴ ad 40°. 40′. 43″; ſed hæc Æquatio ſolis augeri debet in ratione excentricitatis orbis Jovis ad

excentricitatem orbis terræ, ſive in ratione æquationis maximæ centri Jovis ad æquationem maximam centri Solis quamproximè, hoc eſt, in ratione 5°. 31′. 36″ ad 1° 66′. 20: unde ſi æquatio maxima medii motûs lunæ fuerit 11′. 50″, erit æquatio maxima medii motus ſolis 2″. 8‴, in mediocribus ſcilicet Jovis a ſole diſtantiis; in aliis locis æquationi centri Jovis proportionalis eſt. In his omnibus vim Saturni utpote inſenſibilem negligo.

Atque eâdem methodo ad alias Solis æquationes æquationibus lunaribus analogas procedere liceret, niſi in hujuſmodi minutis exquirendis jam nimius eſſem: cum quæ in hac propoſitione recenſentur, tametſi præ cæteris notabiles, Obſervationum Aſtronomicarum ſolertiam omnem fortaſſe fugere debeant: cæterum tales re ipſa eſſe ſcire juvat; et plures fruſtrà commemorarem. *Q. E. I.*

Essay II.

Fig. 1. p. 737.

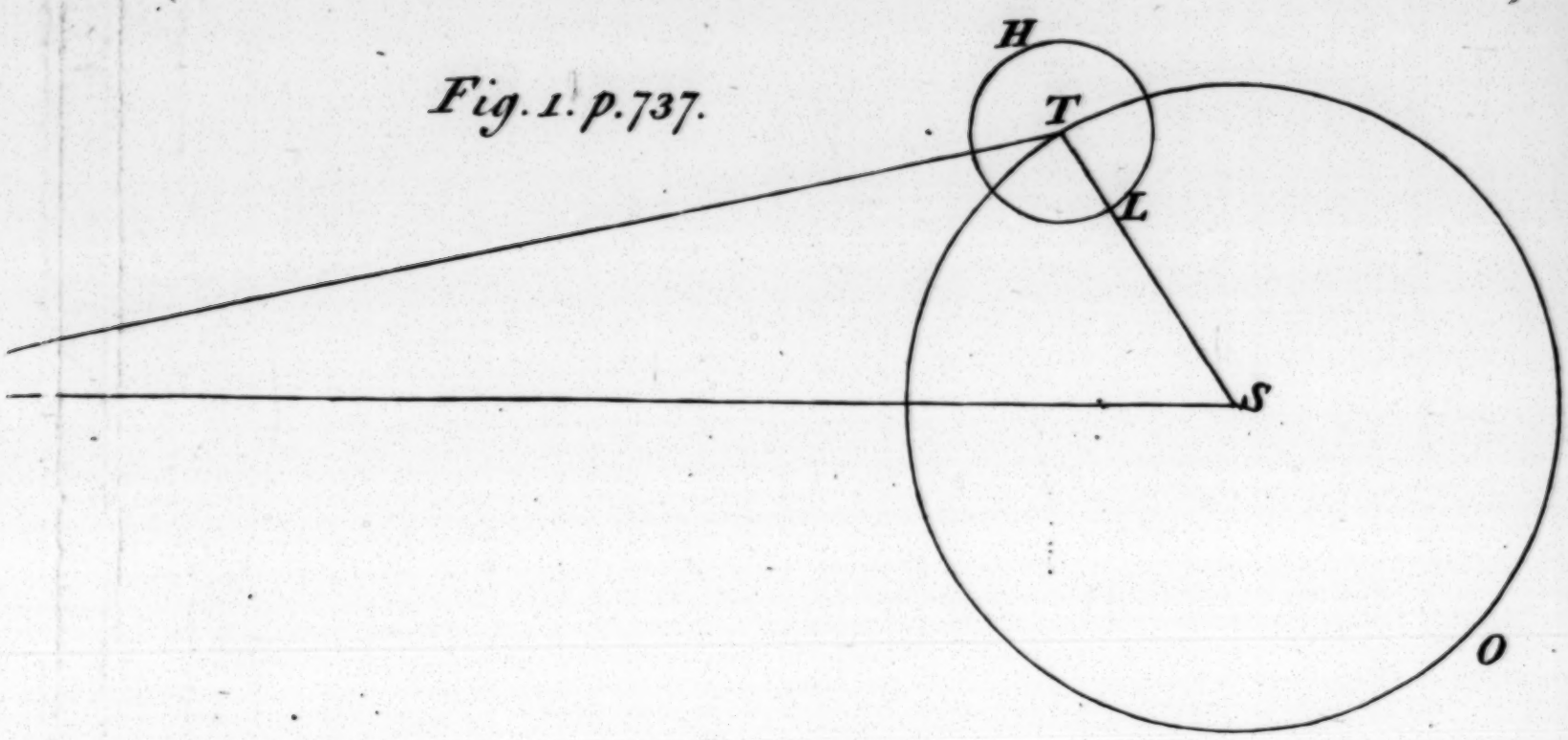


Fig. 2. p. 742.

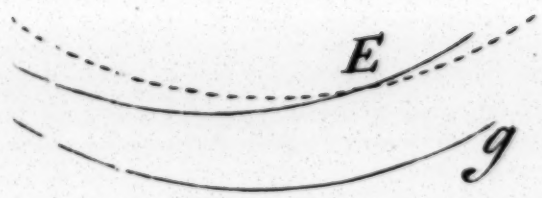
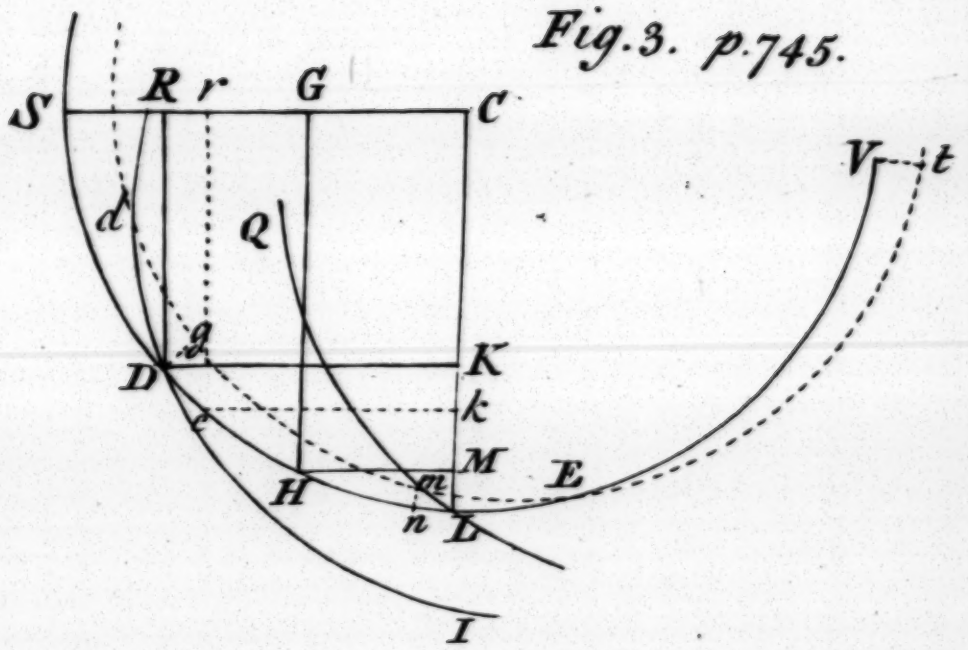


Fig. 3. p. 745.



J. Mynde sc.

Philos. Trans. Vol. XLIX. TAB. XXIII. (2) p. 704.

Fig. 1. p. 704.

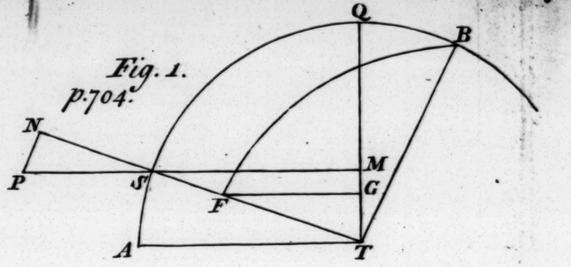


Fig. 2. p. 706.

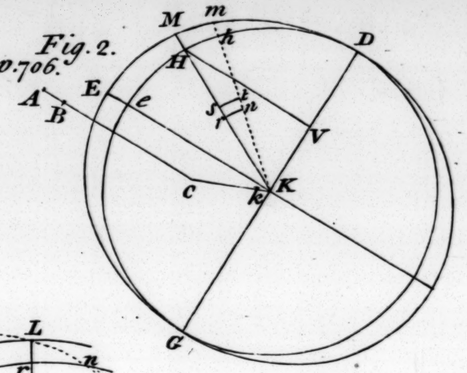


Fig. 3. p. 709. 713. 718.

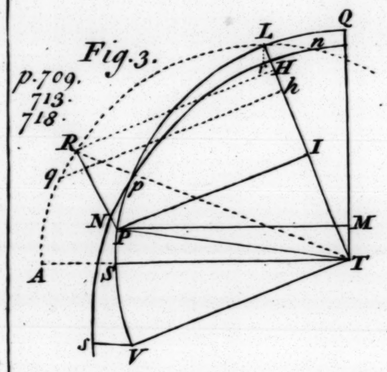


Fig. 4. p. 711.

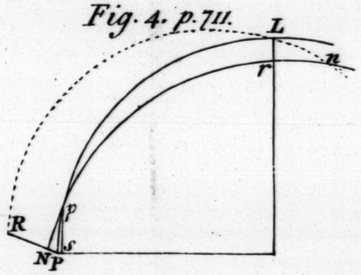


Fig. 7. p. 733.

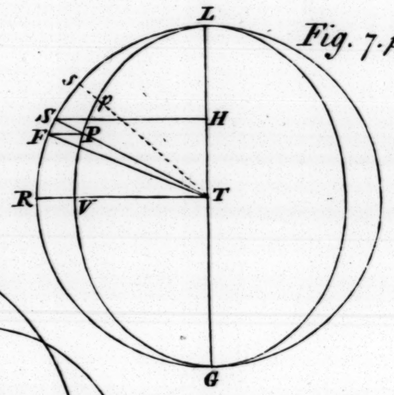


Fig. 6. p. 722.

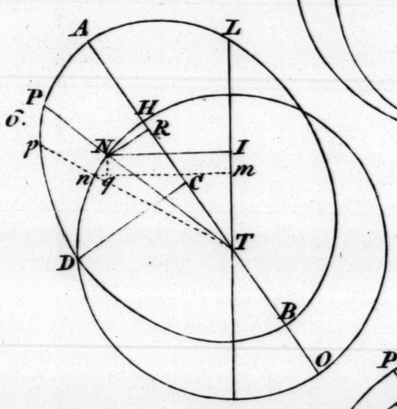


Fig. 5. p. 714. 720.

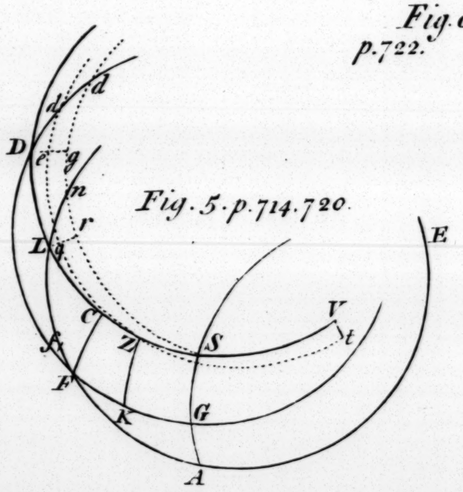
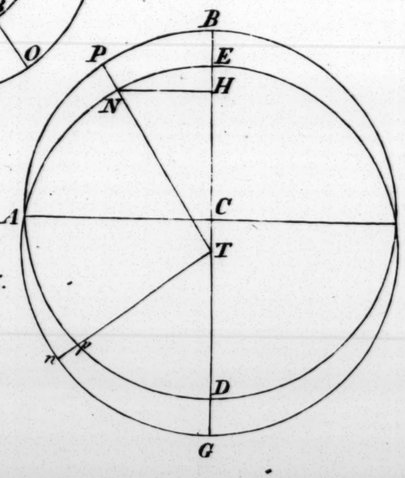


Fig. 8. p. 735.



Essay II.

Fig. 1. p. 737.

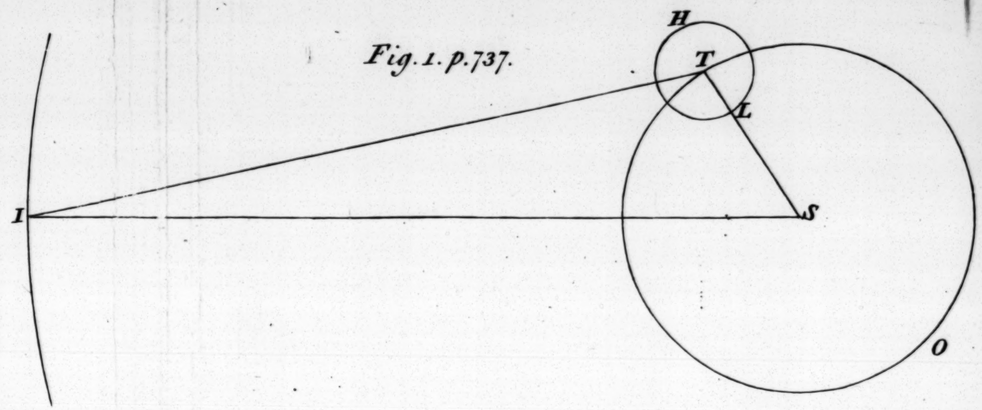


Fig. 2. p. 742.

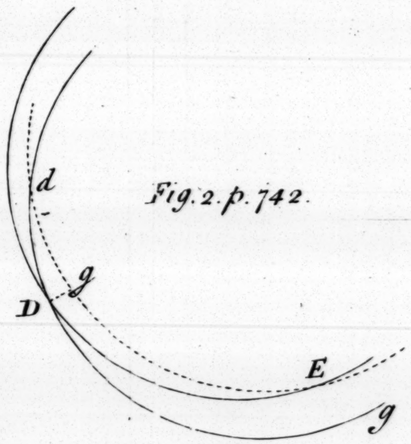
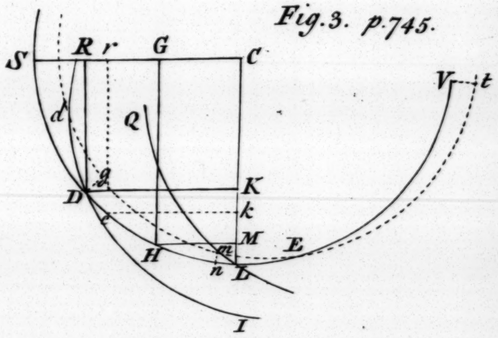


Fig. 3. p. 745.



J. Mynde sc.

CX. *A Journal of the Weather in* Dublin *for the Year* 1753; *by* James Simon, *F. R. S.* and *S. A.*

Read Nov. 4, 1756.

JANUARY 1753.

D.	Morning.		Noon.		Night.		Wind.
1	30 4	Fg	30 3	Fg Rn	30 1½	Rn	Var.
2	29 19	Cy Rn	29 17	Rn	29 15	Rn	ENE
3	29 14	Rn Hl	29 12	Sw Rn Hl	29 11½	Rn Sw Hl	ENE
4	29 13	Cy Rn	29 15	Cy Rn	29 17½	Fg	Var.
5	29 19½	Fg	29 19	Fg	29 19	Fg Ft	E
6	29 17	Fg ⊙ Ft	29 17	Cy Ft	29 17	Fg Ft	SE
7	29 18	Fg	29 17½	Fg	29 18	Fg	NW
8	29 17	Fg	29 16	Cy	29 14	Cy	WNW
9	29 13	Cy ⊙	29 11½	⊙ Cy	29 7	Rn	WNW
10	28 19	Rn	28 16	Rn	28 12	Rn Wy	Var.
11	28 14	Wy ⊙ Cd	28 18	⊙ Cd	29 2	Fr Cd	WSW
12	29 5½	Rn	29 2½	Rn Wy	28 16	Rn Hl St	SE
13	28 10½	Fg Rn	28 18	Rn Wy	29 2½	Rn Wy St	WNW
14	29 8½	Fr ⊙	29 9½	Fr ⊙	29 12	Ft Fr	WNW
15	29 15	⊙	29 16	⊙	29 17	Fr Cd	WNW
16	29 14	Fr	29 11½	Fr	29 9½	Rn	S
17	29 12	Cy Rn	29 14½	Rn	29 17	Fr	NW
18	29 16	Fr Cd	29 14	Cy Cd	29 12½	Fg Cd	NW
19	29 12	Cy Rn	29 13	Sw Cd Ft	29 16	Fg Cd Ft	Var.
20	29 18	Fr Ft	29 18½	Ft Fg	29 17½	Fg Ft	WNW
21	29 15	Rn	29 16½	⊙	29 18	Fr Ft	WNW
22	29 18	Fg Fr	29 18	Fr	29 18½	Fg Ft	Var.
23	29 19½	Fg Fr	29 19½	Fr	29 19½	Fg Ft	S
24	29 16½	Cy Wy	29 16	Cy Wy	29 16	Rn Wy	SEstr.gu.
25	29 14½	Cy Wy	29 13½	Rn	29 14½	Rn Wm	SW
26	29 18	Fr ⊙	29 18	⊙	29 16½	Fr Cd	SW
27	29 14	Cy Rn	29 11½	Cy Rn	29 11	Cy	SW
28	29 11	Cy ⊙	29 12	Cy Cd	29 12½	Fr Cd	SSE
29	29 10	Cy Rn	29 8½	Rn Cy	29 7	Wy	SW
30	29 5½	Cy ⊙	29 5	⊙ Cy	29 4	Rn St	SW
31	29 3	Rn	29 4	Rn ⊙	29 4	Fr Wy	WSW

A Journal of the Weather in *Dublin* for the Year 1753.

FEBRUARY 1753.

D.	Morning.			Noon.			Night.			Wind.
1	29	7	Fr Wy	29	9	⊙ Wy	29	7	St	WSW
2	29	7	Wy Fr	29	13½	⊙ Wy	29	19½	Fr Ft	NNW
3	30	2	Fr ⊙	30	3	⊙ Ft	30	3½	Fg Ft	WNW
4	30	3	Ft	30	3	Rn	30	3	Fr Cd	S
5	30	2	Fr ⊙	30	1	⊙	29	19½	Ft Sw	SE
6	29	17	Ft Sw ⊙	29	16	Sw ⊙	29	15	Sw.	NNE
7	29	13	Sw	29	12	Sw.	29	11	Rn	N
8	29	12	Fr	29	12	Fr	29	12½	Fr	SE
9	29	13½	Fr ⊙	29	14	⊙	29	15	Fg	E
10	29	14½	Cy ⊙	29	14	⊙	29	13	Fg Cd	WNW
11	29	11½	Hl Rn Sw	29	10½	Sw Rn	29	9	Sw	ENE
12	29	7	Sw Rn	29	5	Hl Sw	29	5	Sw	E
13	29	1	Rn	28	19	Rn	28	13	Rn Wy	Var.
14	28	9	Cy Wy	28	12	⊙	28	16½	Fr Wy	W
15	28	19	Fr ⊙	29	2	⊙ Cd	29	4	Fr	Var.
16	28	17	Rn St	28	16	⊙ Rn St	29	1	Fr Wy	SW
17	29		Fr ⊙	28	18	Cy Rn	28	15	Rn	WSW
18	28	14½	⊙	28	14	⊙ Rn Hl	29		Fr	W
19	29	2	⊙	29		⊙ Cy	28	15	Rn	E
20	28	16	⊙	28	15	Rn St	28	18	Rn St	SW
21	29	9	⊙	29	14	⊙	29	14	Rn Fr	WNW
22	29	15	Cy Rn	29	12	Rn	29	7½	Fr Cy	SE
23	29	5	⊙	29	17	⊙	29	17	Fr	WNW
24	30		⊙	29	18	⊙	29	17	Fr Wy	Var.
25	29	17	⊙ Cd	30	1	⊙ Cd	30	5	Fg	Var.
26	30	6	⊙	30	6½	⊙	30	6	Fr Cd	E
27	30	6	⊙	30	5	⊙	30	4	Fr Ft	E
28	30	3	⊙	30	3	⊙	30	2	Fr Ft	E

A Journal

A Journal of the Weather in *Dublin*, for the Year 1753.

MARCH 1753.

D.	Morning.		Noon.		Night.		Wind.
1	30	Cy Rn	29 19½	Rn Sw.	29 19½	Rn Sw	E
2	29 19	Cy	29 18	Cy	29 16	Cy	E.
3	29 16	Cy ⊙	29 17	⊙ Cy	29 18	Fr	Var.
4	29 19	Fg ⊙	29 18½	⊙	29 19	Fg	SE.
5	29 19½	Fg ⊙	30	⊙	30	Fr	Var.
6	30 3	Cy Rn	30 5	Cy	30 5	Cy Fg.	E
7	30 6	Fg ⊙	30 7	⊙	30 7	Fg	E
8	30 6	Fg ⊙	30 6	⊙	30 5	Fr	E.
9	30 4	⊙	30 3	⊙	30 2½	Fg	ESE.
10	30	Fg ⊙	29 18	⊙ Cy	29 17	Wy	ESE.
11	29 15	Cy ⊙	29 13	Cy	29 8	Cy Wy	SSW.
12	29 2	Cy Rn	29 7	Rn Fr	29 10	Fr	W
13	29 10	Cy Rn	29 9	⊙	29 9	Rn	WSW
14	29 9½	Cy ⊙	29 9½	Rn ⊙	29 8	Rn Wd	WSW.
15	29 10	⊙ Wd	29 10	⊙ Wd Cd	29 4	Rn St	WSW
16	28 18.	Rn St	29 2	⊙ Rn	29 2	Rn Wd	WSW.
17	29 2½	Cy ⊙	29 2	⊙ Rn	29 5	Rn	WSW.
18	29 4	⊙ Cy Rn	29 6	Rn ⊙	29 13	Hl Rn Cd	WSW
19	29 18	⊙	29 18	⊙	29 16	Fr Wd	WSW
20	29 14	Cy ⊙	29 12	Cy St	29 11	Rn St	WSW.
21	29 13½	Cy ⊙	29 16	Rn ⊙	29 18	Cd Fg	WNW.
22	29 16	⊙	29 12	Rn	29 12	Rn	SE.
23	29 11	Cy ⊙	29 8	Cy Rn	29 4	Rn Wd	ESE.
24	29 3	Cy ⊙	29 5	⊙	29 8	Fr Fg	W
25	29 8	⊙ Rn	29 4	Rn ⊙	29 2	Rn Wd	S
26	29 4½	Cy ⊙	29 8	⊙ Rn Hl	29 10	Rn Fr	WSW.
27	29 10	⊙ Rn	29 10	⊙ Rn	29 9	Fr Wd	S
28	29 6½	Cy	29 5	Cy	29 6	Fr	SSE.
29	28 18	Wd Rn	28 15	Rn	29 2	Fr Wd	E
30	29 4	⊙ Rn	29 5	⊙ Rn	29 4	Fr	E
31	29	Wd Rn	29 2	Rn Hl	29 5	Hl Fr	ESW.

A Journal

A Journal of the Weather in *Dublin*, for the Year 1753.

APRIL 1753.

D.	Morning.			Noon.			Night.			Wind.
1	29	8	⊙ Cd	29	8	⊙ Cd	29	2	Rn Wd	WSW
2	29	3	Rn ⊙	29	3	⊙	29	4	Wd Cd	WNW
3	29	4	⊙ Hail	29	4	Rn Hl ⊙	29	3	Fr	WNW
4	28	16	Rn ⊙	29	2	⊙	29	4	Rn Cd	NE
5	29	6	⊙ Cd	29	6	⊙ Cd	29	8	Fr Fg	WNW
6	29	9	⊙ Hl	29	10	⊙ Hl Rn	29	13	Fr Fg	WNW
7	29	15	⊙	29	16	⊙ Cy	29	16	Fr	NNW
8	29	14	⊙	29	14	⊙ Hl Rn	29	17	Fr Cd	N
9	29	18	Cy ⊙	29	19½	⊙	29	19½	Fr Cd	NNE
10	29	17	Cy Hl Rn	29	14	Hl Rn ⊙	29	14	Rn Fr	NNW
11	29	12½	Cy Hl Rn	29	14	⊙ Rn	29	13	Hl Rn	NE
12	29	15	Cy ⊙	29	15	⊙	29	15	Fr Fg	ENE
13	29	13	Cy Rn	29	9	Rn	29	8	Rn	W
14	29	9	Cy ⊙ Rn	29	10	⊙	29	12	Fr	W
15	29	11	⊙	29	11	⊙	29	8	Rn	NE
16	29	4	Cy Rn	29	3	Rn	29	4	Cy	WSW
17	29	3	Cy ⊙ Rn	29	2	Rn ⊙	29	7	Fr	SW
18	29	8	Cy ⊙ Rn	29	10	Cy ⊙ Rn	29	11	Fr	WSW
19	29	12½	Fr Cy	29	12½	Cy ⊙	29	13	Fr Rn	SSW
20	29	13	Cy ⊙	29	16	⊙	29	17	Fr	SW
21	29	17	Cy ⊙	29	17	⊙ Rn	29	17	Cy Rn	SW
22	29	16	Cy	29	15	Cy	29	14	Cy Rn	SW
23	29	14	⊙	29	14½	⊙	29	14½	Fr Rn	WSW
24	29	13	Cy ⊙	29	12	Rn Cy ⊙	29	11	Cy Rn	W
25	29	5	Rn	29	3	Rn	29	5	Cy Fr	S
26	29	4	Cy Rn	29	5	Rn ⊙	29	7	Fr Fg	Var.
27	29	8	Cy ⊙	29	8	⊙	29	7	Rn	SE
28	29	8	Cy	29	8	Rn	29	10	Fr	W
29	29	10	⊙ Hl Rn	29	10	Cy Rn	29	9	Cy Wd	WSW
30	29	7	Cy ⊙	29	11	⊙ Rn	29	14	Fr	WSW

A Journal of the Weather in *Dublin* for the Year 1753.

MAY 1753.

Ds	Morning.		Noon.		Night.		Wind.
1	29 14	Cy	29 13	Cy Rn	29 14	Cy Rn	W
2	29 14	Rn	29 17	Rn Cy	30	Fr	WNW
3	30 2½	⊙	30 3½	⊙	30 4	Fr	NW
4	30 4	⊙	30 4	⊙	30 5	Fr	E
5	30 6	⊙ Cd	30 6	⊙ Cd	30 6	Fr Cd	E
6	30 6	⊙ Cd	30 3	⊙	30 3	Fr Cd	E
7	30 1½	⊙	30 1	⊙	30	Fr	E
8	30	⊙	30	⊙	30	Fg	E
9	29 19½	⊙	29 19	⊙	29 18	Fr	E
10	29 17	Cy ⊙ Rn	29 15	⊙ Rn	29 16	Cy Cd	W
11	29 15	⊙ Hl	29 15	⊙ Rn	29 15	Cy Cd	W
12	29 13	Cy Rn	29 12	Cy ⊙ Rn	29 12	Rn Cy Cd	S
13	29 8	Rn St	29 8	Rn ⊙ Wd	29 10	Fr Cd	W
14	29 10	⊙ Rn	29 11	Cy Rn	29 9½	Cy Wd Cd	W
15	29 4	St Rn	29 3	Wd Hl Rn	29 4½	Wd Cd	W
16	29 5	Wd ⊙ Cy	29 6½	⊙ Cy Rn	29 8	Cy Rn	W
17	29 10	⊙ Cd Rn	29 10½	⊙ Rn	29 11	Fr	WNW
18	29 12	Rn Hl	29 13	Rn ⊙	29 16	Fr	WNW
19	29 16	Cy Rn	29 15	Rn	29 14	Cy Rn	SSE
20	29 16	Wd ⊙	29 17	⊙	29 16	Rn	WNW
21	29 14	Rn Cy	29 15	Rn Hl	29 17	Fr	W
22	30	⊙	30 2	⊙	29 3	Fr Ht	Var.
23	30 4	⊙	30 4	⊙	30 4	Fr Ht	ESE
24	30 3	⊙	30 2	⊙ Cy	30 1	Cy	SSE
25	29 19	⊙	29 18	⊙	29 18	Fr Ht	SSE
26	29 18	Cy ⊙	29 16½	⊙	29 16	Fr Ht	E
27	29 16	⊙ Cy	29 16	⊙ Cy	29 18	Cy	Var.
28	29 19½	Cy ⊙	30 1	Cy Rn	30 2	Fr	Var.
29	30 4	Cy ⊙	30 4	⊙	30 5	Fr	Var.
30	30 4	Cy ⊙	30 3½	⊙ Cy	30 3	Cy	Var.
31	30 2	⊙	30 1	⊙	29 19½	Cy	ENE

A Journal of the Weather in *Dublin* for the Year 1753.

JUNE 1753.

D.	Morning.			Noon.			Night.			Wind.
1	29	18½	⊙	29	18	⊙ Ht	29	18	Cy	NE
2	29	18	⊙	29	18	⊙ Ht	29	19	Fr	NE
3	29	19½	⊙	30		⊙ Ht	29	19½	Fr	ENE
4	29	19	⊙ Cy	29	19	Cy Rn ⊙	29	17	Cd Cy	E
5	29	17	Cy	29	18	⊙	29	19	Fr	NW
6	29	19	Cy	29	19½	Cy	29	19½	Cy Cd	Var.
7	29	19	⊙	29	18½	⊙	29	17½	Fg	E
8	29	17	⊙	29	17	⊙ Ht	29	17	Cy Cd	WSW
9	29	17	⊙ Cy	29	18	Cy Rn	29	18½	Cy Ht	SW
10	29	18	Cy	29	19	Rn Cy Ht	29	18½	Cy Ht	Var.
11	29	18	⊙	29	17½	⊙	29	17	Fr Cd	E
12	29	16	Cy Rn	29	16	Rn Cy	29	16	Cy Cd	E
13	29	14½	Cy ⊙	29	14	⊙ Cy	29	15	Cy Rn	Var.
14	29	17½	⊙	29	18	⊙	29	18½	Fr Cd	NNW
15	29	17½	Cy Rn	29	17½	Cy ⊙	29	18	Fr Cd	NNW
16	29	17½	Cy ⊙	29	17	⊙ Ht	29	16	Fr Cd	Var.
17	29	13	Rn Cy	29	12	Rn Cy	29	17½	Fr Cd	Var.
18	30		⊙ Cd	29	19½	⊙ Cy	30		Fr Cd	E
19	30		⊙ Cd	30		Cy Cd	30		Fr Cd	W
20	29	18	Rn	29	15	Rn	29	14	Cy Cd	Var.
21	29	12½	⊙ Cd	29	13	Cy ⊙ Hl	29	14	Cy Cd	NW
22	29	13	Cy Cd ⊙	29	11½	Rn ⊙	29	10	Cd	WNW
23	29	11	⊙ Wd Cd	29	12	⊙ Cy Cd	29	13	Fr Cd	NW
24	29	13½	Cy ⊙ Wm	29	13	Cy Fr	29	13	Fr Cd	Var.
25	29	12½	⊙ Cy	29	12	ThdHlRn	29	12	Cy	Var.
26	29	12½	Cy	29	12½	Cy	29	11½	Rn Cy	SW
27	29	10	Cy Wd Rn	29	10	Rn	29	11	Cy	SSE
28	29	13	⊙ Rn	29	15	⊙ Rn	29	16	Fr	Var.
29	29	16½	⊙	29	17	⊙	29	16½	Fr Rn	S
30	29	16	Cy Rn	29	17	Rn Cy	29	17	Cy	S

A Journal

A Journal of the Weather in *Dublin* for the Year 1753.

JULY 1753.

D.	Morning.		Noon.		Night.		Wind.
1	29 17	Rn	29 16	Rn Cy	29 16	Rn Cd	S
2	29 14	⊙ Cy	29 12	⊙ Cy	29 10	Rn Cd	ESE
3	29 8	Cy ⊙	29 10	⊙	29 10	Fr	ESE
4	29 10	⊙	29 10	Cy Rn	29 9	Rn Cy	ESE
5	29 10	⊙ Cy Rn	29 10	Rn Cy	29 13	Fr	Var.
6	29 14½	Cy ⊙	29 15	Rn	29 16	Fr	SSE
7	29 15	Rn	29 13	Rn	29 11½	Rn	Var.
8	29 11	Rn	29 10½	Rn	29 11	Rn	Var.
9	29 12	⊙ Rn	29 11½	Rn	29 12	Fr	WSW
10	29 11½	⊙ Rn	29 11	Rn	29 9½	Rn	Var.
11	29 8	Cy Rn	29 8½	Rn ⊙	29 9½	Rn Fr	Var.
12	29 9½	Cy Rn	29 10½	Rn Fr	29 12	Fr	SW
13	29 13½	⊙ Rn	29 15	Rn Cy	29 16	Fr	Var.
14	29 14	Cy Rn	29 12½	Rn	29 10½	Rn	S
15	29 9	Cy ⊙ Rn	29 8	Rn ⊙	29 8	Rn	W
16	29 10	⊙ Rn	29 13	⊙	29 14	Fr	N
17	29 15½	⊙	29 15	⊙ Cy	29 16	Fr	ENE
18	29 16	⊙	29 16	⊙	29 16	Rn	Var.
19	29 16	Rn ⊙	29 16½	Cy ⊙	29 17½	Fr	Var.
20	29 19	Cy ⊙	29 19½	⊙ Cy	30 ½	Fr	NNW
21	30	Cy ⊙	30 ½	⊙	30 1	Fr	Var.
22	30	Cy ⊙	30	⊙ Ht	29 19½	Fr Cd	ESE
23	29 19½	⊙ Ht	30	⊙ Ht	30	Fr	NE
24	30	⊙ Ht	30 1	⊙ Ht	30	Fr	E
25	30	⊙ Ht	29 19½	⊙ Ht	29 19	Fr	E
26	29 18	⊙ Cd	29 17	⊙ Wm	29 17	Fr	NW
27	29 16	Cy ⊙	29 16	⊙	29 16	Fr	E
28	29 15	Cy ⊙	29 15½	Cy ⊙	29 16	Fr Cd	WNW
29	29 16	Cy ⊙	29 16½	⊙ Cy	29 17	Cy Cd	NE
30	29 16	Cy ⊙	29 16	⊙ Cy	29 16	Cy	NW
31	29 16	Cy ⊙	29 15	Cy	29 15	Cy	WNW

A Journal of the Weather in *Dublin*, for the Year 1753.

AUGUST 1753.

D.	Morning.			Noon.			Night.			Wind.
1	29	11½	Rn	29	7½	Rn	29	5	Rn	SSE
2	29	4	⊙ Cy Rn	29	5	⊙ Rn	29	6	Rn	W
3	29	8	⊙ Rn	29	9	⊙ Rn	29	10	Rn	WNW
4	29	6	Rn	29	3½	Rn	29		Rn	E
5	29		Rn	29	2	⊙ Wd	29	6½	Fr Wd	WNW
6	29	8	⊙ Rn	29	10	⊙ Rn	29	10	Fr Wd	WSW
7	29	9½	Cy ⊙ Rn	29	9½	Cy ⊙	29	9	Fr Cd	WSW
8	29	8	Cy	29	7	Rn	29	7	Cy Cd	ESE
9	29	7	Cy	29	8	Cy	29	9	Rn Cd	ESE
10	29	11	Cy Rn ⊙	29	12	⊙	29	13½	Fr	S
11	29	13	Cy ⊙	29	14	⊙	29	15	Fr	Var.
12	29	15	Cy Rn ⊙	29	13½	Rn ⊙	29	11	Rn	Var.
13	29	7	Rn ⊙	29	5	⊙	29	4½	Rn Cd	SE
14	29	3½	Rn	29	6	Rn	29	7	Fr Cd	Var.
15	29	5	Cy Rn ⊙	29	2½	Rn St	28	19	Rn Cd	SE
16	29	1	Cy ⊙ Rn	29	4	Rn ⊙	29	9	Fr Cd	N
17	29	11	Cy Rn	29	12	Rn Cy	29	15	Fr Cd	NW
18	29	17	⊙	29	18½	⊙ Cy	30		Fr Cd	WNW
19	29	19	Cy ⊙	29	19½	⊙ Wm Rn	30		Fr Cd	WNW
20	30	1	⊙	30	½	Cy Fr	30		Fr	W
21	29	19	Cy ⊙	29	18½	⊙	29	19	Cy Wd	W
22	29	19	Cy ⊙	29	19½	⊙	29	19	Fr	WSW
23	29	19	Cy ⊙	29	18	⊙ Rn	29	17	Rn	WSW
24	29	18	⊙	29	19	⊙	29	19	Fr	W
25	29	18	⊙	29	16½	⊙	29	14	Rn	SE
26	29	11	Rn Wd	29	12	Rn ⊙	29	15	Fr	W
27	29	17	⊙	29	18½	⊙ Cy	29	19	Rn	W
28	29	18½	Cy ⊙	29	18	Cy ⊙	29	16	Fr	SE
29	29	13	⊙	29	14	⊙	29	14	Fr	W
30	29	12	⊙ Wd Rn	29	13	Rn Wd Cd	29	13	Fr Wd	SW
31	29	13	Cy ⊙ Rn	29	15	⊙ Wm	29	17½	Fr	WNW

A Journal of the Weather in *Dublin*, for the Year 1753.

SEPTEMBER 1753.

D.	Morning.		Noon.		Night.		Wind.
1	29 16	Cy Rn Wd	29 15	Rn Cy Wm	29 16	Fr Wm	W
2	29 17	Fr ⊙ Wd	29 17½	⊙ Cy	29 16	Fr Wm	SW
3	29 15	⊙ Cy	29 15½	Cy ⊙	29 15	Cy Wd	WNW
4	29 14	Cy ⊙	29 14½	⊙	29 17	Cy	W
5	29 17	⊙	29 19½	⊙	30	Fr	W
6	29 19	Cy ⊙	29 19	Cy	29 17½	Cy Wd	W
7	29 17	Cy ⊙	29 17	⊙ Cy	29 18	Rn Cy	W
8	29 18½	Cy Rn	29 18	Rn ⊙	29 18	Cy	W
9	29 17½	Cy Rn	29 18½	Rn ⊙	29 18	Cy	W
10	30	Cy ⊙	30 1	⊙ Wm	30 1	Fr Wm	Var.
11	30 1	Cy ⊙	30 1½	Cy Wm	30 3	Wm Fr	WNW
12	30 3	⊙	30 3½	⊙ Cy Wm	30 3	Wm Fr	Var.
13	30 2	Cy ⊙	30 1	⊙ Ht	30	Wm Fr	E
14	29 18½	⊙	29 18½	⊙	29 18	Wm Fr	ESE
15	29 16	Cd ⊙	29 15	⊙	29 13	Cy +	ESE +
16	29 15	⊙	29 17	⊙ Wd	29 18	Fr +	W +
17	29 17	⊙ Wd	29 16	⊙ Wd	29 16	Cy Wd	SW
18	29 14½	⊙ Wd	29 15	⊙ Wd	29 16	Cy Wm	WSW
19	29 15	Cy Wd	29 15	Cy Rn	29 15	Rn Wm	WSW
20	29 15	Fr ⊙	29 15½	⊙ Wm	29 17½	Fr Wm	Var.
21	29 18½	⊙ Cd	29 17	⊙ Cd	29 17	Fr Cd	WNW
22	29 15	Cy ⊙	29 15	⊙ Cy	29 14½	Cy Rn	Var.
23	29 14	Cy Wd ⊙	29 14½	⊙ Wd	29 15	Cy Rn	W
24	29 15	⊙	29 16½	⊙	29 17½	Fr Cd	WNW
25	29 18	⊙	29 18	⊙	29 17	Cy	S
26	29 15	⊙	29 13	⊙	29 13	Cy	SSE
27	29 10½	Rn	29 7½	Rn	29 4½	Cy Rn	SE
28	29 ½	Cy ⊙	29 2	⊙	29 3	Cy	SW
29	29 6	⊙ Wd Cd	29 8	⊙	29 8	Cy	SW
30	29 2	Rn St ⊙	29	Wd Rn ⊙	29 5	Cd Wd Fr	SSW

Nota. Flaſhes of Fire at about 8 o'Clock at Night, at the N. N. E. the 15th and 16th Inſtant.

A Journal of the Weather in *Dublin* for the Year 1753.

OCTOBER 1753.

D[e]	Morning.			Noon.			Night.			Wind.
1	29	6½	Cy ⊙	29	5	Cy Rn Cd	29	6	Fr Cd St	WSW
2	29	7½	Fr ⊙	29	9	⊙ Rn	29	11	Fr Wd Cd	WSW.
3	29	10	Fr ⊙	29	13½	⊙	29	15	Fr Cd	W
4	29	14½	Fr ⊙	29	14	⊙	29	13	Rn Cy	SSW
5	29	13	Rn Cy	29	13	Rn	29	13½	Cy	S
6	29	14½	⊙	29	16	Cy	29	16	Fr	SW
7	29	15	Cy Rn	29	13½	Cy	29	13½	Lg Wm	SSE
8	29	12½	⊙	29	10½	Cy	29	9½	Rn Wm	SSE
9	29	9½	Rn ⊙	29	10	⊙ Rn	29	10	Fr,	NW
10	29	5	Fr ⊙ Rn	29	2	Rn	28	19½	Rn	SSE
11	28	18	Wd Rn	28	17	⊙	28	19	Lg St	SSE
12	28	19½	Cy ⊙	28	19½	⊙	28	19½	Wd Rn	SSE
13	29	4	⊙	29	8	⊙	29	8	Cd St	SSW.
14	29	7	Cy	29	9	Rn	29	12½	Cd	WSW.
15	29	13½	⊙ Wd	29	11½	Rn Wd	29	12	Rn Cd	SW
16	29	11½	⊙ Wd Rn	29	10	Rn ⊙	29	14	Cy Cd	W
17	29	18½	⊙ Cy	29	19½	Cy	29	16½	Rn Wd	W.
18	29	11	Wd Rn	29	11	Rn ⊙	29	11½	Rn	W
19	29	13	Cy	29	15	Cy ⊙	29	16½	Fr Cd	WNW.
20	29	18	⊙ Cd	29	18½	⊙ Cd	29	19½	Fg Cd	W
21	30		⊙ Cd Fg	30	1	⊙	30	1½	Fg Cd	E
22	30	3	Fg ⊙	30	3	⊙	30	3½	Fg Cd	Var.
23	30	3½	Fg Cy	30	3½	Cy Rn	30	3½	Fg	W
24	30	3½	Fg ⊙	30	3½	⊙	30	4½	Fr	E
25	30	3½	Fg Rn	30	3½	Rn	30	4	Fr	E
26	30	2½	Cy Rn ⊙	30	2	Rn	30	2	Rn Cy	NE
27	30	3	Cy Rn	30	2½	Rn	30	3½	Fr	E
28	30	3	Cy	30	2	Cy	30	½	Cy	NW
29	29	17	Cy Cd	29	16½	⊙ Cy Cd	29	17½	Fr Cd	NW
30	29	18	⊙ Cd	29	18	⊙	29	14	Cy Cd	NW
31	29	13½	☾	29	13½	☾	29	14	Fg Cd	W

A Journal

A Journal of the Weather in *Dublin* for the Year 1753.

NOVEMBER 1753.

Dy	Morning.		Noon.		Night.		Wind.
1	29 8	Rn	29 5½	Rn	29 6	Rn Cy	W
2	29 8	⊙	29 11½	Fr	29 13½	Fg	NNW
3	29 13½	Fg Fr ⊙	29 14½	Fr	29 15½	Fr Wd	WSW
4	29 16	Cy Rn	29 17	Rn Cy ⊙	29 17	Fr Wd	WSW
5	29 16	Cy Rn	29 16	Rn HlWd	29 17	Fr Cd	WNW
6	29 16	Fr ⊙ Cd	29 15	Cy Wd ⊙	29 18	Fr Cd	NW
7	29 18	Fr Dk	29 18	Dk Cd	29 18	Dk Cd	N
8	29 18	Dk Cd	29 18	Dk Cd	29 18	Fg Rn	N
9	29 19	Fg ⊙ Cd	29 18	Cy Cd	29 18	Fg Cd	N
10	29 15	Fg ⊙ Cd	29 14	Fr ⊙	29 9	Cy Cd	W
11	29 4	Rn ⊙	29 3	⊙ Cy Rn	29 2½	Rn Cy	W
12	29 4	Fg Cy	29 5½	Cy	29 9½	Fg Ft	WNW
13	29 14½	Fg ⊙	29 15	Dk Ft	29 17½	Fg Ft	WNW
14	29 15½	Fg Wd	29 14½	Cy	29 12½	Rn Cy Wd	WSW
15	29 5	Cy St Rn	29 4	Wd Rn Hl	29 5	Cy Ft	W
16	29 5	Cy ⊙ Cd	29 5	⊙ Cd Wd	29 7	Fr Cd	W
17	29 6½	Fg ⊙ Cd	29 6	⊙ Cd	29 5	Fr Ft Ft	WSW
18	29 4	Fg Ft ⊙	29 3½	⊙ Fg Ft	29 2	Fg Ft	W
19	29 4½	Fg ⊙	29 6½	⊙ St	29 10	Fg Ft	W
20	29 13½	Fg ⊙	29 14½	⊙	29 15	Fg Ft	W
21	29 13½	Fg Rn	29 12	Rn	29 14½	St Wm	W
22	29 13	Cy St	29 12½	⊙ Cy St	29 12½	Cy Wd	S
23	29 13	Cy	29 12½	Cy	29 13½	Cy Fr	SW
24	29 17	Fr ⊙	29 19	Fr ⊙	30	Fr ⊙	SW
25	29 13½	Rn Wd	29 12½	Rn	29 12	Rn St	SW
26	29 1	Rn	28 19	Rn	29	Rn St	W
27	29 9½	St Fr	29 12	Fr Wd	29 13	Ft	WNW
28	29 15	Ft ⊙	29 15	⊙ Ft	29 17	Ft	WNW
29	29 18	Fg Ft	29 17	Fg Ft	29 16	Fg Ft	WNW
30	29 14½	Fg Ft	29 15½	Fg Thg	29 17½	Rn	Var.

A Journal of the Weather in *Dublin* for the Year 1753.

DECEMBER 1753.

D.	Morning.			Noon.			Night.			Wind.
1	30		Fg Fr Cd	30	1½	Cd Fr	30	2½	Fg Cd	NW
2	30	4	Fg Dk Cd	30	3½	Dk Cd	30	3½	Dk Cd	NNE
3	30	2½	Dk Cd	30	2½	Dk Cd	30	2	Fg Ft	E
4	30	1	Fg Ft	30		Ft	29	18½	Fg	W
5	29	15	Cy Rn	29	13½	Rn	29	14	Rn	Var.
6	29	14	Sw Cd	29	14½	Sw Cd	29	15	Fr Ft	NNW
7	29	17	Fr Ft	29	19	Ft Fr	29	19½	Ft Fr	WNW
8	30	2	Ft	30	1½	Ft Dk	30	1	Ft	W
9	30		Ft	30		Ft	29	18½	Ft	Var.
10	29	15	Thg Rn	29	12	Rn	29	8	Rn	SE
11	29	7	Rn	29	6	Rn	29	4	Rn	E
12	29	1	Rn	28	19	Rn	28	16	Rn St	Var.
13	28	19	Rn St	28	19	Cy Wd	29	5½	Fr	WSW
14	29	5	Rn	29	3½	Cy Wd	29	4	Wd Rn	Var.
15	29	10	Cy Fr	29	11	Cy Fr	29	10½	Cy Rn	SE
16	29	8	Rn	29	7½	Cy	29	8	Rn	WSW
17	29	4½	Rn	29	1½	Rn	29	4	Cy	Var.
18	29	6	Cy ⊙	29	7	Cy ⊙	29	9	Cy Rn	W
19	29	7	Rn	29	6	Rn	29	5	Rn	W
20	29	7	Cy	29	8	Fr ⊙	29	8	Fr	WSW
21	29	10	Cy ⊙	29	10	⊙ Cy Rn	29	10	Cy St	WSW
22	29	10½	Cy Rn	29	10	⊙ Rn	29	10	Cy Wd	WSW
23	29	13	Cy Rn	29	13	Rn	29	10	Fr	WSW
24	29	4	Cy ⊙	29	6	Rn Wd	29	13½	Fr	W
25	29	11½	Rn	29	8½	Rn	29	7	Rn	WSW
26	29	3	Rn Wd	29	5	Fr Wd	29	7	Rn Wd	WSW
27	29	9	Fr ⊙ Cd	29	12½	Hl Sw	29	11	Fr	WNW
28	29	17½	Ft ⊙	30		⊙ Ft	30	2	Ft	NNE
29	30	4½	Ft ⊙	30	3½	⊙ Ft	30	3	Ft	NNW
30	30	½	Ft Fg ⊙	30		⊙ Ft	29	19½	Cd	SW
31	30		Cy	29	19½	Cy	29	19	Fg Wd	WSW

The

The Barometer made uſe of for theſe obſervations has a tube $\frac{1}{4}$ of an inch diameter, and holds 2lb of quick-ſilver.

The height of the quickſilver I generally take about 7 o'clock in the morning, 2 in the afternoon, and 9 at night; and the different changes in the weather as they happened in the day.

I have divided the ſcale of my barometer in inches, from 28 to 31, and each into 20 parts, ſo that when you find in this journal 29 $1\frac{1}{2}$, it is 29 inches $\frac{3}{40}$ parts of an inch.

Explanation of the Marks.

Cd Cold.	Hl Hail.	St Storm.
Cy Cloudy.	Ht Heat.	Sw Snow
Dk Dark.	Lg Lightning.	Thd Thunder.
Fr Fair.	⊙ Sunſhine.	Thg Thawing.
Fg Fog.	Rn Rain.	Wd or Wy Wind.
Ft Froſt.	Sl Sleet.	Wm Warm.

A Journal

A Journal of the Weather in *Dublin* for the Year 1754.

JANUARY 1754.

D.	Morning.			Noon.			Night.			Wind.
1	29	15	Cy	29	17½	Cy	29	19	Cd	WSW
2	30		Cy	29	15	Cy	29	16	Cy	WSW
3	29	17½	Fg ⊙	29	16	Rn	29	16½	Rn Cy	W
4	29	13½	Cy ⊙ Wd	29	10	⊙ Cy Wd	29	6	Cy St	WSW
5	29	2	Cy Wd	29	2	Cy St	29	5	Cy	WSW
6	29	2	Rn Sw	29	1½	Cy Rn	29	1	Fr	W
7	29	6	Fr ⊙	29	5	⊙ Cy	29	1	Cy Cd	W
8	29	½	Cy ⊙	29	2	Fr ⊙	29	5	Fg	ENE
9	29	11½	Fg Cy	29	10½	Cy	29	10	Fr Wd	WSW
10	29		Wd Rn	28	16	Rn St	28	16½	Rn St	SSW
11	29	1	Fr	29	4½	Fr	29	7	Ft	WSW
12	29	2	Cy	28	17½	Rn	28	17½	Cy	S
13	28	16½	Cy Rn	28	15	Rn	28	12½	Rn St	SW
14	28	11	Cy ⊙	28	12	Fr	28	12	Rn	W
15	28	16	Cy ⊙	28	17	⊙	28	15	Rn	Var.
16	28	19	Cy ⊙	29	4	⊙	29	6½	Fr	Var.
17	29	3½	Cy	29	2½	Cy	29	3½	Rn	WSW
18	29	10	Fr	29	13½	Fr ⊙	29	17½	Fr Cd	WSW
19	30		Fg	30	2	Rn	30	4½	Cy Wm	W
20	30	5	Cy Rn	30	5	Cy Rn	30	4½	Cy Wm	W
21	30	3½	Cy Rn	30	5½	Rn Cy	30	6	Cy Wm	WSW
22	30	6½	Cy ⊙	30	7	⊙	30	5	Fg	WSW
23	29	18½	Cy	29	18	Cy	29	17½	Cy	W
24	29	9	Cy Rn	29	5	Rn	29	7	Fg Ft	WNW
25	29	8	⊙ Ft	29	7½	⊙ Ft	29	7	Fg Ft	WNW
26	29	8	Ft ⊙	29	9½	Sleet	29	11	Fg Ft	WNW
27	29	12	Ft ⊙	29	12	St ⊙	29	14	Ft	NW
28	29	15	Ft ⊙	29	15½	⊙ Ft	29	18	Ft	NW
29	29	19½	Ft ⊙	29	19½	Ft ⊙	30		Ft Sw	NW
30	30	1	Sw Ft	30	1½	Thg	30	2	Thg	WNW
31	30	3	⊙ Cd	30	3	⊙ Cd	30	3	Fr Cd	WNW

A Journal of the Weather in *Dublin* for the Year 1754.

FEBRUARY 1754.

D.	Morning.			Noon.			Night.			Wind.
1	30	2	⊙ Rn	30	½	Cy Rn	29	17½	Cy	WNW
2	29	15	St ⊙ Sw	29	14½	⊙ Cy Sw	29	14½	Wd Ft	NW
3	29	15	Ft ⊙	29	15	⊙ Ft	29	15	Ft	NW
4	29	11½	Fg Cy	29	8½	Rn	29	4	Rn	NW
5	29	1½	Cy Rn	29	1½	Rn Sw	29	2	Fr	SE
6	29	3	Cy Rn	29	4	Rn Sw	29	4	Rn	SE
7	29	8	Cy	29	10	Cy Fr	29	12	Fr Cd	SE
8	29	13	Ft ⊙	29	12	Rn Sw ⊙	29	9½	Rn	SE
9	29	9½	Fr ⊙	29	11	⊙	29	12	Fr	SE
10	29	3	Rn Wd	29	6	Rn ⊙ Wd	29	5	Cy RnWd	WSW
11	29	9	Cy Rn	29	9	Rn	29	8½	Rn St	WSW
12	29	9	Rn St	29	8	Rn St	29	7½	Rn St	WNW
13	29	5	Cy Rn	29	5	Rn ⊙	29	11	Fr	WNW
14	29	19	Fr Cy	29	16½	Cy	29	15	Cy	WSW
15	29	13	Fr ⊙	29	14	⊙ Cy	29	16	Cd	W
16	29	18	Fr ⊙	29	18½	⊙	29	16	Cy	W
17	29	16	Cy Wd Rn	29	19	Fr	30		Fr	W
18	30	7	⊙	30	7	⊙	30	7	Fr	NE
19	30	5	Fg ⊙	30	3	Dk	30		Cy	NE
20	29	16	Cy ⊙	29	15	⊙	29	14	Fr	SW
21	29	15½	⊙	29	19½	⊙	30	2	Fr	SW
22	30	1	⊙	29	18	⊙	29	17	Fr	W
23	29	16½	⊙ Hl Rn	29	18½	⊙ Hl Rn	29	18½	Fr	W
24	30	2½	⊙ Cd	30	2	⊙	30	1½	Fg	W
25	29	15	Cy Wd Hl	29	16	Cy Wd Rn	29	17	Cy	W
26	29	18	⊙	29	19	⊙	30	1	Fr	WNW
27	30	2	Cy ⊙ Wm	30	1	⊙ Wm	30	1	Fr	Var.
28	29	19½	⊙	29	19½	⊙	29	19	Fr	W

A Journal of the Weather in *Dublin* for the Year 1754.

MARCH 1754.

D.	Morning.		Noon.		Night.		Wind.
1	29 18	⊙	29 17½	⊙	29 16½	Fg	SE
2	29 16½	Cy Rn ⊙	29 18	⊙	29 19	Fg	W
3	30 1	Fg ⊙ Rn	30 ½	Cy ⊙ Rn	30 2	Cy	Var.
4	30 2	Fg ⊙	30 2	⊙	30 2½	Fg	Var.
5	30 3	Cy	30 3	Cy	30 3	Cy	Var.
6	30 6	⊙	30 7	⊙ Cd	30 7½	Fg Ft	SE
7	30 7½	Ft Fg ⊙	30 6	⊙	30 4½	Fr	NW
8	30 1½	Cy ⊙	30 1	⊙	29 19½	Fg	WNW
9	29 17½	Cy Rn	29 17½	Rn Cy	29 17½	Cy	ENE
10	29 18	Cy Cd ⊙	29 19	⊙ Cd	30 ½	Cd	ENE
11	30 2	Cy Hl Sw	30 3	Cy Cd	30 4	Cy Hl Cd	ENE
12	30 4	⊙ Hl	29 3½	⊙	30 2	Cy Sw	ENE
13	29 16	Sw Rn	29 10	Rn	29 9	Wd Ft	WNW
14	29 9	Wd ⊙	29 10	St	29 11	Cd Ft	NNW
15	29 12	⊙ Sw Wd	29 12½	Wd Sw ⊙	29 14	Ft	NNW
16	29 14	Dk	29 14½	Dk	29 14½	Fg Ft	NNW
17	29 14	⊙ Sw	29 12½	Dk Sw ⊙	29 13	Cd	NNW
18	29 11	⊙ Sw	29 10	Sleet ⊙	29 9½	Wd	SE
19	29 12	Cy ⊙	29 13	⊙	29 12½	Cd Dk St	SE
20	29 5	Rn	29 7½	Rn	29 9	Cy	Var.
21	29 12	⊙ Rn	29 15	⊙ Rn	29 19½	Dk	W
22	30 1½	⊙ Wm	30 2½	⊙ Cy	30 4	Dk	WNW
23	30 3½	Dk ⊙	30 3	⊙	30 4	Rn Cy	WNW
24	30 3½	Dk Slt	30 3	Slt Sw	30 2	Rn Cy	E
25	30 1	Rn Cy	30	Rn	29 19½	Rn Cy	ENE
26	29 18	Cy Rn	29 19	Cy	29 19	Cy Cd	E
27	30	Cy ⊙	30 2	Cy ⊙	30 3	Cy Cd	E
28	30 3½	⊙ Cd	30 4	⊙ Cd	30 4	Fr Cd	ENE
29	30 2	⊙	30 2	⊙	30	Cy Cd Sw	NE
30	29 18	Sw ⊙	29 18	⊙	29 15½	Fg	NE
31	29 7½	Cy Rn	29 5	Rn Wd	28 19	Rn Wd	WSW

A Journal

A Journal of the Weather in *Dublin* for the Year 1754.

APRIL 1754.

D.	Morning.			Noon.			Night.			Wind.
1	28	17	Cy ⊙ Wd	29		Cy ⊙ Cd	29	3	Fr St Wd	WNW
2	29	5½	⊙ S *v*	29	7	⊙ Hl	29	9½	Fg	W
3	29	8½	Cy Rn ⊙	29	8	⊙ Cy	29	7½	St	SE
4	29	4½	⊙ Rn	29	4½	⊙ Rn Wd	29	7½	Cy	Var.
5	29	8½	Rn	29	6½	Rn	29	6	Rn Cy Wd	SE
6	29	8	Cy Rn ⊙	29	9	Rn ⊙	29	11½	Cy Fg	E
7	29	13	⊙	29	13	⊙	29	12	Fr	S
8	29	13	Cy Rn Hl	29	14	Rn Hl	29	16	Fr	SSE
9	29	17½	Fr ⊙	29	18	⊙	29	18½	Fg	E
10	29	18	⊙	29	18	⊙	29	17½	Cy	E
11	29	17½	Cy Rn	29	19	Rn Cy	30	1	Fg	W
12	30	2½	⊙	30	3	⊙	30	3	Fr	Var.
13	30	1½	Cy ⊙ Wm	30	1	⊙ Wm	30	1	Fg	NNW
14	29	18	Cy Wd	29	14	Cy Wd Rn	29	12	St Rn	W
15	29	14	⊙ Rn Hl	29	14	⊙ Hl Wd	29	14	Cy	WNW
16	29	14	⊙ Hl Rn	29	14	Hl ⊙ Rn	29	14½	Cy	Var.
17	29	10	Cy Rn	29	7	Rn	29	7	Cy	W
18	29	7	⊙ Cy Sw	29	8	Hl ⊙ Cd	29	9½	Fg Ft	WNW
19	29	10	Cy ⊙ Hl	29	10½	Hl Sw ⊙	29	12	Fg	NNW
20	29	6	Rn Sw	29	4½	Rn Sw	29	7	Rn Wd	SE
21	29	14	⊙	29	14½	⊙	29	16	Fr	NW
22	29	18	⊙	30		⊙	30		Fr	Var.
23	29	19½	⊙	29	19½	⊙	30		Fg	Var.
24	29	17	Cy Rn	29	17	Rn	29	15	Rn	WNW
25	29	15½	Cy Rn	29	15	⊙ Rn	29	15	Fr Rn	WNW
26	29	14	Cy Rn	29	14	⊙ Rn	29	14	Rn Wm	W
27	29	14½	Cy Rn	29	14½	Cy Rn	29	14½	Rn Wm	ENE
28	29	15	Cy Rn	29	15	Rn	29	16	Rn Wm	ESE
29	29	17	Cy ⊙	29	18	⊙	29	18	Fr Cd	ESE
30	29	17	Cy ⊙	29	17	⊙	29	18	Fr Cd	E

A Journal of the Weather in *Dublin* for the Year 1754.

M A Y 1754.

D.	Morning.			Noon.			Night.			Wind.
1	30		Fr ⊙	30	1	Fr Cy	30	2	Fr	Var.
2	30	1	⊙ Wm	30	1½	⊙ Wm	30	1	Fr Cy	Var.
3	29	18	Cy ⊙	29	15	Cy ⊙	29	14	Rn Cy	S
4	29	12	Rn	29	10	Cy Rn	29	9½	Cy Cd	NW
5	29	5	Rn Wd	29	3	Rn Wd	29	5	Cy Cd	SE
6	29	8	⊙	29	9	⊙	29	9½	Fr	Var.
7	29	9	⊙	29	9	⊙	29	9	Rn	ESE
8	29	9	Cy ⊙	29	9	⊙	29	10	Fr	E
9	29	9	⊙	29	11	⊙	29	13	Fr	E
10	29	14	Fr ⊙	29	15	⊙	29	15	Fr	Var.
11	29	15	Cy	29	15	⊙ Cy	29	15	Rn	Var.
12	29	13	Cy Rn	29	12	⊙	29	12	Rn	SW
13	29	11	Cy Rn	29	10	Rn	29	9	Rn Wd	SSE
14	29	10½	Fr ⊙	29	12	⊙	29	15	Fr	W
15	29	15	Fr ⊙	29	15	⊙	29	15	Fr	SW
16	29	14	Cy Rn ⊙	29	12	⊙ Rn	29	10	Rn	Var.
17	29	6	⊙ Wd Rn	29	7	Wd Rn ⊙	29	10	Fr Cd	W
18	29	10	Cy Rn	29	10	Cy Wd	29	10	Cy Wd Cd	S
19	29	12½	Fr ⊙	29	14	Cy ⊙	29	16	Fr	S
20	29	15	⊙	29	15	⊙	29	14	Fr	E
21	29	14	⊙	29	13	⊙	29	13	Fr	E
22	29	13	⊙	29	12½	Cy	29	11	Cy Rn	ENE
23	29	7	Rn	29	6	Rn	29	6	Rn	E
24	29	7	Cy Rn	29	7	Rn	29	8½	Rn	E
25	29	11	Cy ⊙	29	12	⊙	29	13	Fr	Var.
26	29	14	Fr ⊙	29	16	⊙	29	17	Fr Cd	ENE
27	29	18	Cy ⊙	29	19½	⊙	29	19½	Fr	E
28	29	19	⊙ Wm	29	19½	⊙ Wm	29	19	Fr Wm	ENE
29	29	18	⊙	29	17	⊙	29	15	Cy	ESE
30	29	13	Cy ⊙	29	12	Cy ⊙	29	10	Cy	S
31	29	9½	⊙ Rn	29	11½	⊙ Rn	29	11½	Cy Rn	SE

A Journal

A Journal of the Weather in *Dublin* for the Year 1754.

JUNE 1754.

D[s]	Morning.			Noon.			Night.			Wind.
1	29	7½	Cy Rn Wd	29	6	Wd ⊙ Rn	29	9	Fr	SSE
2	29	8	Cy Wd Rn	29	6½	Rn Wd ⊙	29	7	Cy	S
3	29	6½	Rn ⊙ Wd	29	6	Rn ⊙	29	7	Cy	SSE
4	29	9	Cy Rn ⊙	29	9	Rn ⊙	29	11½	Cy	Var.
5	29	12	Cy ⊙ Rn	29	13	⊙ Rn	29	13	Cy	E
6	29	13½	Cy Rn	29	14	Rn	29	15	Rn	NNW
7	29	16	Cy ⊙	29	16	Cy ⊙	29	15	Fr	NNW
8	29	13	Cy	29	13½	Cy Rn	29	14	Rn Cy	WNW
9	29	14	Cy Rn	29	12	Cy Rn Wd	29	7	Rn St	WNW
10	29	9	St ⊙ Rn	29	11	⊙ Wd	29	13	Fr	WNW
11	29	12	Rn ⊙	29	14	⊙ Rn	29	15	Cy Rn	W
12	29	16	Rn ⊙	29	17	Cy ⊙	29	17	Cy	WSW
13	29	16½	Cy	29	15	Rn Cy	29	14	Rn Cy	Var.
14	29	12	Rn	29	10	Rn	29	9	Cy Wd	NE
15	29	9½	Rn	29	11	⊙ Cy	29	12	Fr	E
16	29	12	⊙	29	13	⊙	29	13	Fr Wm	E
17	29	13	Fr ⊙	29	13	⊙	29	13½	Fr Wm	Var.
18	29	13	Fr ⊙ Rn	29	15	Cy ⊙	29	17½	Wd Fr	WNW
19	29	19½	Fr ⊙	30	1	Dk ⊙	30	2	Fr	WNW
20	30	1	⊙	30		⊙	29	18	Cy	SE
21	29	16	Cy Rn	29	14½	Rn Cy	29	14	Rn Cy	Var.
22	29	15	Cy ⊙	29	15½	Cy ⊙ Rn	29	16	Fr Cy	Var.
23	29	16	⊙	29	17	Rn ⊙	29	16	Cy Rn	WSW
24	29	12	Rn	29	10	Rn	29	9	Rn Cy	ESE
25	29	8	Cy Rn	29	8	Rn ⊙	29	9	Cy	W
26	29	8½	⊙ Rn	29	10	Cy ⊙	29	12	Fr	WNW
27	29	14	Cy ⊙ Rn	29	12	Rn ⊙	29	13½	Fr	NW
28	29	12	⊙ Rn	29	9	Rn Wd	29	7	Wd Cd	W
29	29	12	Cy	29	13	⊙	29	12	Rn Cd Wd	SE
30	29	12	Cy Wd Rn	29	12	⊙ Rn Wd	29	13	Cy Wd Cd	W

A Journal of the Weather in *Dublin* for the Year 1754.

JULY 1754.

D	Morning.		Noon.		Night.		Wind,
1	29 15	Cy ⊙ Rn	29 16	⊙ Ht	29 18	Fr Wm	WNW
2	29 18	⊙	29 18	⊙ Rn	29 16	Rn	WSW
3	29 13½	Cy Rn	29 14	Cy	29 14½	Cy Wm	WNW
4	29 15	Fr ⊙	29 15½	⊙ Ht	29 15	Ht Fr	W
5	29 14	Fr ⊙	29 14	⊙ Cy	29 13	Rn Cy	W
6	29 14	Fr ⊙ Cy	29 14	Rn Cy ⊙	29 14	Cy Wd	W
7	29 14	Rn	29 14	Rn	29 14	Rn Wd	W
8	29 15	Cy Rn	29 16	⊙ Cy	29 16	Cy	WNW
9	29 15	Cy Rn ⊙	29 14½	Cy ⊙ Rn	29 14	Cy	NW
10	29 15	⊙	29 16	⊙	29 16	Cy	NNE
11	29 15	Cy ⊙	29 12	Cy Rn	29 9½	Rn Cy	SW
12	29 11½	Rn Cy	29 13½	⊙	29 14	Fr Wm	WNW
13	29 12	Dk ⊙	29 11½	⊙	29 15	Fr	W
14	29 10	⊙ Rn	29 11	Rn	29 12	Rn Cy	W
15	29 12	Cy Rn	29 12	Hl	29 12	Cy Cd	Var.
16	29 10	⊙ Rn Hl	29 8½	Rn ⊙	29 7	Cy Cd	SE
17	29 7½	Cy Rn ⊙	29 10	⊙ Rn Cy	29 12	Cy Cd	NW
18	29 13	⊙ Cd	29 13	⊙ Cd	29 14½	Fr Cd	SSE
19	29 14½	Cy Rn ⊙	29 16	⊙ Rn	29 17	Fr Cd	SE
20	29 18½	⊙	29 18	Rn	29 16	Cy Wd Cd	SW
21	29 15	Cy Rn	29 13	Rn Cd	29 10	Rn Wd Cd	ESE
22	29 8½	⊙ Rn	29 8	⊙ Rn	29 9½	Rn Cd	WSW
23	29 10	⊙ Cy Rn	29 12	⊙ Cy	29 13	Fr	W
24	29 7	St Rn	29 3	Rn Wd	29 2½	Rn Wd	SSE
25	29 8	Cy ⊙	29 11½	⊙ Wm	29 11	Wd Fr	Var.
26	29 12	Rn	29 13	Cy ⊙	29 13	Fr	SW
27	29 14	⊙	29 15	⊙ Rn	29 16½	Rn	WSW
28	29 17½	Fr ⊙	29 18	⊙ Rn Hl	29 19½	Fr	WSW
29	30	⊙	30	½ Cy ⊙ Rn	30 1	Rn	SE
30	29 18½	Cy Rn	29 17½	Cy	29 16½	Cy Wd Cd	SSE
31	29 14½	Cy Rn	29 14½	Cy Rn	29 14½	Cy Cd	SW

A Journal

A Journal of the Weather in *Dublin*, for the Year 1754.

AUGUST 1754.

Ds	Morning.		Noon.		Night.		Wind.
1	29 13½	Cy Rn ⊙	29 13½	Cy Rn	29 14	Cy Cd	WNW
2	29 13½	Cy Rn	29 13½	Cy Rn	29 14	Cy	Var.
3	29 14	⊙	29 13½	⊙	29 12	Cy	SSE
4	29 9	Cy ⊙	29 10	⊙	29 12	Fr	WNW
5	29 10	⊙	29 10	⊙	29 11	Fr	SSE
6	29 10	Fr Cy	29 9	Cy Rn	29 6	Rn	Var.
7	29 6	⊙	29 8	⊙	29 7	Cy Rn	Var.
8	29 4½	Rn ⊙ Wd	29 7	⊙ Wd Rn	29 10	Cy	WSW
9	29 12	⊙	29 15	⊙	29 17	Fr	W
10	29 17½	⊙	29 18½	⊙	29 19½	Fr	Var.
11	29 18½	Fr ⊙	29 18	⊙	29 15	Cy	Var.
12	29 15	⊙	29 16	⊙	29 16	Fr	Var.
13	29 15	Cy	29 14½	Cy	29 14	Cy	Var.
14	29 13	Cy ⊙	29 13	⊙ Rn	29 12	Cy Wd	Var.
15	29 11½	Rn	29 14	⊙	29 16½	Fr	WNW
16	29 17½	⊙	29 19½	⊙ Ht	30 ½	Fr	SE
17	30	⊙	30 ½	⊙ Ht	30	Fr	ESE
18	29 18½	Fr ⊙	29 18	⊙	29 17½	Fr	E
19	29 17	⊙ Rn	29 16½	Rn Cy	29 15	Fr	NE
20	29 14½	⊙ Ht	29 14	⊙ Ht	29 13½	Fr	E
21	29 13	⊙ Ht	29 13	⊙ Ht	29 12½	Cy Fr	E
22	29 12	Cy ⊙	29 12	⊙ Ht	29 12	Cy Fr	W
23	29 11½	⊙ Ht	29 11½	⊙ Ht	29 11½	Fr	W
24	29 10	Cy	29 9½	Cy	29 9½	Cy	NE
25	29 11	Cy ⊙	29 12½	⊙	29 16½	Fr	E
26	29 17½	⊙	29 18	⊙ Wd	29 18½	Cy Cd	W
27	29 16	Cy ⊙ Wd	29 14	⊙ Rn Cd	29 16	Cy	W
28	29 18	⊙	29 19	⊙	30 1	Fr Cd	SSW
29	30 1	⊙ Cd	30	Cy Rn	29 19	Rn Cy	SSW
30	30	⊙	30 1	Cy ⊙	,0 3	Fr	NW

A Journal

A Journal of the Weather in *Dublin* for the Year 1754.

SEPTEMBER 1754.

D[s]	Morning.			Noon.			Night.			Wind.
1	30	2	⊙	30	2½	⊙ Ht	29	2	Fr	Var.
2	30	2	⊙	30	2	⊙	30	3	Fr	E
3	30	3½	⊙	30	4	⊙ Ht	30	3½	Fr	E
4	30	3	⊙	30	2½	⊙	30	2	Fr	NE
5	30	1	⊙	30	1	⊙	30	2½	Fr	WNW
6	30	1	⊙	30		Cy ⊙	30		Cy	W
7	29	18	Cy Rn	29	16½	Cy Rn	29	14	Cy Rn	WSW
8	29	14	Cy Rn	29	15	⊙	29	17½	Fr	WNW
9	29	16	Cy ⊙	29	15	Rn Cy	29	14½	Fr	WSW
10	29	13	Cy ⊙	29	12	⊙	29	12	Cy	WSW
11	29	11	Rn	29	12½	Rn ⊙	29	11½	Fr	WNW
12	29	18½	⊙	30		⊙	30	2	Fr	W
13	30	2	Fr ⊙	30	2½	⊙	30	3	Fr	WSW
14	30	3½	Fr ⊙	30	4	⊙	30	5	Fr	WSE
15	30	5½	⊙	30	6	⊙	30	7	Fg	E
16	30	7½	⊙	30	7½	⊙	30	7	Fg	E
17	30	6½	⊙	30	6	⊙	30	5	Fg	E
18	30	4½	⊙	30	6	⊙	30	5	Fr Wm	E
19	30	4	Fg ⊙	30	3½	⊙	30	3	Cy Cd	E
20	30	2	Cy ⊙	30	2	Cy ⊙	30	1	Fr	E
21	30		⊙ Cy	30		Cy	30	1½	Fr	ESE
22	30	1½	⊙	30	1½	⊙	30	1½	Fr	E
23	30	1	⊙	30		⊙	29	18½	Fr	ESE
24	29	17½	⊙	29	17	⊙	29	16	Fr Cy	ESE
25	29	15½	Rn ⊙	29	16	⊙	29	15½	Cy	ESE
26	29	15	⊙	29	13½	Cy	29	9½	Rn	SW
27	29	14½	⊙	29	17	⊙	30		Fr	Var.
28	30	1	⊙	30	1	⊙	30	1	Fr	E
29	29	19½	⊙	29	19½	⊙	30		Fr	ESE
30	29	19½	⊙	29	19	⊙	29	19	Fg Fr	SE

A Journal

A Journal of the Weather in *Dublin* for the Year 1754.

OCTOBER 1754.

D.	Morning.			Noon.			Night.			Wind.
1	29	18	⊙	29	17	⊙	27	17	Rn	SE
2	30	½	⊙	30	3	⊙	30	6	Fr Cd	WNW
3	30	5	⊙	30	5	⊙	30	5	Fr	W
4	30	2½	Dk ⊙	30	1	Cy	29	19	Cy Cd	Var.
5	29	13	Cy ⊙	29	11	Cy Rn	29	11	Rn	W
6	29	8½	⊙	29	6	⊙ Rn	29	7	Cy Cd	W
7	29	7	⊙ Cd Rn	29	9	Rn ⊙	29	11	Fr	WNW
8	29	10	⊙	29	7	⊙ Rn	28	18	St Rn	S
9	28	14½	⊙	28	12½	⊙	28	9½	Wd St	SE
10	28	9	Rn Wd	28	16	Rn Wd ⊙	28	17	Wd St	WSW
11	29	3	⊙ Wd	29	4	⊙ Rn	28	19½	Rn	WSW
12	29	3½	⊙	29	7	⊙ Rn	29	7	Rn Cy	W
13	29	10	⊙	29	12½	⊙	29	16	Fr	W
14	29	17½	⊙	29	17	⊙	29	18	Fr	S
15	29	15½	Cy ⊙	29	14½	Cy	29	11	Cy Rn St	SE
16	29	5	Cy ⊙	29	8	Rn Cy ⊙	29	4	Rn St	SSW
17	29	9¹	Cy ⊙	29	13	⊙	29	15	Fr	WSW
18	29	17	⊙ Wm	29	18	⊙ Wm	29	17½	Fr	S
19	29	17	⊙ Wm	29	17	⊙ Wm	29	19	Fr	ESE
20	29	19½	⊙ Ht	29	19	⊙ Ht	29	19	Fr	Var.
21	29	18½	⊙ Ht	29	18	⊙ Ht	29	18	Fr	E
22	29	16½	Rn ⊙	29	16	⊙	29	17	Fr	WNW
23	29	17	⊙	29	16	⊙ Cy	29	14½	Rn Wd	WSW
24	29	13½	Cy Wd	29	12	Cy Wd	29	12	Cy Wd	W
25	29	10	Rn	29	7½	Rn	29	4½	Cy Rn	WSW
26	29	2	Rn	29		Rn	28	18	Rn	WNW
27	28	17	Cy Cd Wd	28	17½	Cy Cd Wd	28	18	Cy Wd	NW
28	28	19	⊙ Cd	29		⊙ Cy Cd	29	2½	Fr Cd	Var.
29	29	4½	⊙ Cd	29	5	⊙ Cd	29	6	Fg Cd	WNW
30	29	2½	⊙ Cy	29	1	Cy Rn Wd	29		Rn Wd	SE
31	29	7	Cy	29	11	Cy	29	14	Fr	WNW

A Journal of the Weather in *Dublin* for the Year 1754.

NOVEMBER 1754.

D.	Morning.			Noon.			Night.			Wind.
1	29	16	Dk ⊙	29	18	⊙	30	1½	Fr Fg	WNW
2	30	2	Fg ⊙	30	2	⊙	30		Fr Fg	WNW
3	30		Cy Rn Cd	30		Cy	30	3	Fr Fg	WNW
4	30	3½	⊙	30	3½	⊙	30	1	Fg Cd	WNW
5	29	16	⊙ Rn	29	14	Cy Rn	29	14½	Fr	WNW
6	29	18	⊙	29	8	Cy	29	6	Cy Wd Rn	W
7	28	14	Rn ⊙	28	13	⊙	28	12½	Cy Rn	Var.
8	28	9½	Rn ⊙	28	12	⊙	28	15	Fr	S
9	28	17½	Fr ⊙	28	19	⊙	28	17	Fr Cy	Var.
10	28	12	Rn	28	13	Cy Rn	28	17	Cy	Var.
11	28	16	Fg ⊙	28	16½	⊙	28	17	Fg	Var.
12	28	17	Fg ⊙	28	18	⊙	28	19½	Fg	W
13	29	4	Fg ⊙	29	7½	⊙	29	10	Fg	NW
14	29	12½	Fg ⊙	29	12	⊙	29	10	Fr	S
15	29	8	Cy	29	7	Rn St	29	10	Rn	SE
16	29	12	Fg ⊙	29	15	Fr	29	15	Fg	SE
17	29	17½	Fg ⊙	29	18	⊙ Cy	30		Fg	SE
18	29	19	Cy ⊙	29	19	Cy ⊙	30		Fg	ENE
19	29	19½	Fg ⊙	29	19½	⊙	30		Fr	SE
20	29	19½	⊙	29	19	⊙ Cy	29	18½	Fr	SE
21	29	17½	Cy ⊙	29	16½	⊙ Cy	29	15	Wd	SSE
22	29	12½	Cy	29	16	⊙ Cy	29	18	Fr	SSE
23	29	2	Cy Rn	29	2	⊙ Cy	28	19	Cy	Var.
24	28	14½	Cy	28	16	Rn	29	2	Cy	W
25	29	4	Fg ⊙	29	4½	⊙ Cd	29	7	Fr Ft	WNW
26	29	8	Fg ⊙	29	8	⊙ Cd	29	9	Fg Ft	WNW
27	29	10½	Fg Ft ⊙	29	11½	Dk Ft	29	14	Fg Ft	NW
28	29	17	Fg ⊙	29	19	Dk Ft	30	1	Fg Ft	WNW
29	30	2	Fg Ft	30	2	Dk Ft	30	2	Fg Ft	WNW
30	30		Fg Dk	29	19	Dk Fg Thg	29	17½	Fg	W

A Journal of the Weather in *Dublin*, for the Year 1754.

DECEMBER 1754.

D.	Morning.		Noon.		Night.		Wind.
1	29	15	Fg Cy Rn	29 16	Cy	29 14½	Cy Rn	Var.
2	29	9	Fg Rn	29 5½	Cy Rn	29 5	St Rn	SW
3	29	8	Wd Cd	27 7	Cy	29 6½	St Cy Cd	W
4	29	1½	Wd Cy Rn	28 19½	Wd Rn	29 1	Wd Cy	W
5	29	8	Cy ⊙ Wd	29 11	⊙ Cy Wd	29 11	Fg	WNW
6	29	9	Fg	29 8	Cy Rn	29 7½	Cy Sw	N
7	29	8	Cy Rn	29 3½	Cy	29 1	Cy Rn	SSE
8	29	1½	Dk Cd	29 1	Dk Cd	28 15	St Rn	Var.
9	28	13½	Dk Cd	28 13½	Rn Thd Hl	28 14½	St Rn	WSW
10	28	16½	Dk Wd	28 19	Cy Wd	29 1	St Rn	S
11	29	5	Dk Fg	29 8	Cy Cd	29 12	St Cd	WSW
12	29	10	Dk Wd	29 5	Cy Rn Wd	28 19	St Rn	S
13	28	16	Cd Wd	28 13½	Cy Rn Wd	29 ½	Cy Wd Cd	WSW
14	29	10	Cy Cd	29 11½	Cy Wd Cd	29 9½	Cy Cd	W
15	28	16	Cd St Rn	28 16	Cy Cd	28 16	Fg Cd	Var.
16	29	4½	Dk Cd	29 10	Wd Cd	29 14	Wd Cd	Var.
17	29	13	Dk Ft	29 11	Cd Cy Rn	29 12½	Cd Fg	WNW
18	29	17½	Fg Dk	29 19	Dk Fg Cd	30 ½	Fg	S
19	30	½	Fg Dk	30 ½	Dk	30 1	Cd	Var.
20	30	½	Fg Dk	30 1	Dk	30 2	Cy	S
21	30	1½	Dk Cd	30 1½	Dk Cd	30 1½	Cy Cd	NE
22	30	2	Dk Cd	30 2	Dk Cd	30 2	Dk Cd	ENE
23	30	2	Dk Cd	30 2	Dk Cd	30 2½	Dk Cd	ESE
24	30	2	Dk Cd	30 1½	Dk Cd	30 1	Cy Cd	ESE
25	29	17½	Cy Cd	29 15½	Cy Rn Wd	29 13	Cy Rn	SSE
26	29	14	Dk	29 14½	Fr ⊙	29 16½	Cy	Var.
27	30		Dk Fg Cd	30	Fg Cd	30 ½	Fg	SE
28	30		Ft	30 ½	Cy Rn Cd	30 ½	Cy Cd	SSE
29	30	½	Dk Cd	30 1	Cd ⊙	30 1½	Cd Cy	SE
30	30	1½	Dk	30 2	Cd Cy	30 3	Cd Cy	SSE
31	30	3	Dk Cd	30 3½	Dk Cd	30 4½	Cy Rn Cd	E

Thunder, Lightning, and Hail, 9th *December* Noon.

A Journal of the Weather in *Dublin* for the Year 1755.

JANUARY 1755.

D	Morning.			Noon.			Night.			Wind.
1	30	3	Cy Rn	30	3½	Cd Cy Rn	30	3½	Cy Rn Cd	ENE
2	30	3½	Cy Rn	30	3	Cy Rn	30	3	Cy Rn Cd	ENE
3	30	1½	Cy Rn	30	1½	Cy Rn	30	2½	Cy RnWd	ESE
4	30	4	Dk Sw	30	4	Dk	30	4	Fg Ft	NNE
5	30	2½	Cy Rn	30	4½	⊙ Fg	30	6½	Ft	WNW
6	30	7½	Dk Cd	30	8½	Dk Cd	30	9	Cd Ft	WNW
7	30	7½	Dk Ft	30	7½	Dk	30	7½	Cd	WNW
8	30	6½	Dk Rn	30	6½	Dk Cd	30	5½	Cd	WNW
9	30	4	Cd ⊙	30	3½	⊙ Dk	30	4½	Dk	W
10	30	4	Fg Rn	30	4	Fg ⊙	30	2½	Dk	SW
11	29	18½	Dk	29	16½	⊙	29	12½	Rn	SW
12	29	8½	Cy RnWd	29	8½	⊙ Cd Wd	29	6½	Cd Wd	WSW
13	29	5½	Rn Hl Sw	29	4½	⊙ Cd Wd	29	5½	Cd RnWd	W
14	29	13	Ft Sw ⊙	29	14½	⊙ Cd	29	16½	Cd	W
15	29	15½	Ft	29	14	Cd	29	11	Cd Cy	WSW
16	29	½	Cy Rn	29	½	Cd Rn Sw	29	2½	Cd Rn	WNW
17	29	8½	Ft	29	8½	Cy Rn	29	6	Cy Rn	WSW
18	29	4	Cy Rn	29	3	Cy Wd	29	5	Cy Rn St	S
19	29	4½	Cy Rn	29	1½	Cy Rn St	29	2½	Cy RnWd	SSW
20	28	19½	Cy Rn	29	1½	Cy Wd ⊙	29	4	Cy RnWd	W
21	29	12	Cy ⊙	29	14½	⊙	29	16½	Cd Fg	WSW
22	29	16½	Ft Cy	29	16	Cy Cd	29	16½	Cy Cd	SE
23	29	19	Cy CdWd	29	19½	Cy CdWd	30	½	Cy Cd	SE
24	30		Dk Cd	29	19	Cy Cd	29	18½	Cy Cd	SE
25	29	19½	Dk ⊙	30	½	Cy ⊙ Cd	30	1½	Cy Cd	SE
26	30	2	Ft ⊙	30	2½	⊙ Cd	30	3½	Fg Cd	SE
27	30	4	Fg Ft	30	5	Cy Cd ⊙	30	5½	Cy Cd	NE
28	30	6½	Cy Cd	30	7½	Cd ⊙	30	8½	Fg Cd	NE
29	30	6½	Cy Ft	30	5	Cd ⊙	30	4	Fr Cd	W
30	30	2	Fg Ft	30	½	Fg ⊙	30	½	Cy Cd	WNW
31	30	1	Fg ⊙ Cd	30	1	⊙ Cd	30	1	Cd Fg	N

A Journal of the Weather in *Dublin* for the Year 1755.

FEBRUARY 1755.

Ds	Morning.		Noon.		Night.		Wind.
1	30	Dk Ft ⊙	29 19½	Ft ⊙	29 19½	Fg Ft	WNW.
2	29 19	Dk Fg Ft	29 18½	⊙ Fg Rn	29 19	Rn Cd	WNW
3	29 18½	Dk Ft ⊙	29 19½	Dk ⊙ Cd	30 ½	Fg Ft	Var.
4	30 ½	Dk Fg Ft	30	⊙ Fg Cd	29 18½	Cd Fg	Var.
5	29 13	Dk Ft Wd	29 10½	Cy Rn	29 7	Cy Rn Wd	SE
6	29 2½	Rn	29 3½	Cy Rn	29 3½	Cy Rn	SE
7	29 4½	Cy Wd	29 6½	Dk Cy	29 9½	Dk Ft	E
8	29 9½	Fr ⊙ Ft	29 8½	⊙ Fr Cd	29 7½	Ft	ESE
9	29 4	Cd Dk Fg	29 2½	Cd Cy ⊙	29	St Hl Rn	SE
10	28 17½	Cd Hl Fg	28 17½	⊙ Cy Rn	28 17½	Cy Ft	NE
11	28 18½	Ft Fg	28 18½	⊙ Cd Fr	28 18¾	Fg Ft	WNW
12	28 19¾	Ft ⊙	29 2½	Cd ⊙ Fr	29 8¼	Cy Rn Wd	NW
13	29 14¾	Ft ⊙	29 16½	Cd ⊙	29 19	Fg Ft	E
14	29 19½	Dk Ft	29 18½	Cy Cd Wd	29 16½	Rn Wd Cd	SW
15	29 13	Cy Wd	29 11½	Cy Rn ⊙	29 12½	Cy Rn	SW
16	29 12½	Fg	29 11½	Cd Fg Cy	29 7½	Cy Rn	E
17	29 9½	Fg Fr	29 15	Cy Cd ⊙	29 15½	Cy Cd Wd	NNW
18	29 18½	Fg Ft ⊙	29 17½	⊙ Cd	29 16	Fg	SE
19	29 14½	Fg Rn	29 14½	Cd Rn	29 14½	Rn	Var
20	29 15	Cd Rn Sw	29 15½	Cd Sw Wd	29 16	Cy Cd	NE
21	29 15	Dk Sw St	29 15	Cd Sw Dk	29 14½	Cd Sw	NE
22	29 10½	Cd Dk Sw	29 9½	Cd Dk Sw	29 8½	Cd Sw	NE
23	29 9½	Cd Cy Sw	29 10	Cd Sw Cy	29 12	Cy Cd	E
24	29 13½	Dk Cd	29 14	Dk Cd	29 15	Dk Cd	ENE
25	29 14½	Dk Cd Wd	29 12	Dk Cd	29 10½	Cd Dk	E
26	29 7½	Dk Cd	29 6½	⊙ Cd	29 7¾	Cd Dk	E
27	29 8½	Dk Cd	29 9½	Cd ⊙	29 11	Cd	ENE
28	29 11½	Dk Cd	29 11½	Dk Cd Cy	29 11½	Cy Cd	E

A Journal of the Weather in *Dublin* for the Year 1755.

MARCH 1755.

D	Morning.			Noon.			Night.			Wind.
1	29	9½	Rn ⊙	29	9½	⊙ Cy	29	12½	Dk Cd	W
2	29	13½	Cy ⊙	29	13½	Cd Cy Rn	29	11½	Cy Rn	W
3	29	12½	Rn ⊙	29	12¾	Cy ⊙	29	12½	Fg Cd	Var.
4	29	9½	Dk ⊙	29	6	⊙ Cd Wd	29	5	Cd Cy Wd	SSE
5	29	1¾	Dk ⊙	28	18½	Cd Cy Rn	29	6	Rn Cy	Var.
6	28	13	Cy Rn	28	13	Cy Rn	28	18½	Hl Rn Wd	ENE
7	29	6½	Dk Wd Sw	29	8½	⊙ Dk	29	12	Cd Wd Sw	ENE
8	29	15½	Dk Ft Sw	29	15	Dk Sw Wd	29	17	Cd Wd Sw	N
9	29	16	⊙ Ft	29	16	Dk Cd Wd	29	15	Cd Cy Rn	NNE
10	29	13½	Cd Rn Wd	29	14½	Dk Cd Wd ⊙	29	15	Cd Dk Fg	NNW
11	29	14½	Cd ⊙	29	12	Cy Rn ⊙ Cd	29	10	Cd Wd Rn	W
12	29	11½	⊙ Wd Ft	29	13	⊙ Cd Dk	29	15	Dk Cd	N
13	29	16½	⊙ Ft	29	16½	Cd ⊙	29	15¾	Cd Fg	Var.
14	29	12	⊙ Fg Ft	29	10	Cy Rn ⊙	29	8	Cy Rn Cd	Var.
15	29	6¾	⊙ Dk Hl	29	7	Rn ⊙ Hl	29	4½	Cy Rn Hl	Var.
16	29	5	⊙ Dk Cd	29	5	⊙ Cy Rn	29	4½	Dk Cd	SE
17	29	4¾	Dk Hl	29	5½	Cy Rn	29	8¾	Dk Cd	EN
18	29	14	Dk ⊙ Cd	29	15	Dk Cd	29	16½	Dk Cd	E
19	29	16	Cy Rn ⊙	29	14½	Cy Cd Dk	29	13½	Dk Cd	ESE
20	29	13½	Cy Rn	29	13½	Cy Rn Cd	29	13½	Cy Rn Cd	SSE
21	29	11	⊙ Cd	29	10	Dk Hl Cd	29	8	Dk Cy Cd	ESE
22	29	6¾	⊙ Cd	29	7½	Cd ⊙	29	8	Dk Cd	ENE
23	29	8½	⊙ Cd	29	9	Cd ⊙	29	7½	Dk Cd	SSE
24	29	6½	Cd Cy Rn	29	8½	⊙	29	9	Dk Cd	SE
25	29	6¾	Cy Rn	28	18	⊙ Wd Cy	29	7¾	Wd Cy Rn	Var.
26	29	11	Dk ⊙	29	12½	Wm Rn	29	12	Cy Wm	S
27	29	12½	Cy Rn ⊙	29	14½	Cy ⊙ Wm	29	14½	Cy Wd Wm	S
28	29	9½	Cy Rn	29	7	Cy Wd ⊙ Rn	29	12	Cd Wd Rn	WSW
29	29	16	⊙	29	17	Cy Wd ⊙	29	17½	Cy Wd	WSW
30	29	15	Dk ⊙	29	12	⊙ Wd Dk	29	10	Cy Rn Wd	S
31	29	8	Cy Rn ⊙ Wd	29	4¾	⊙ Wd Rn	29	7½	Dk Cd Wd	SSW

A Journal

A Journal of the Weather in *Dublin* for the Year 1755.

APRIL 1755.

D.	Morning.			Noon.			Night.			Wind.
1	29	10	Cd Cy Rn	29	10	Cy Rn	29	8	Cy Rn	SSE
2	29	8	Dk ⊙	29	4½	Cy Rn	29	2¾	Cy Rn Wd	SSE
3	29	7	Cy ⊙ Rn	29	4	Cy ⊙ Wd Rn	29	4½	Cy Rn Wd	WSW
4	29	6½	⊙ Wd	29	9	⊙ Wd	29	10	Dk Cy	WSW
5	29	8	Rn	29	5	Rn Cd Wd	29	5	Rn Cd Wd	W
6	29	7½	Rn Sw Cd	29	8½	Cy Cd St	29	7	Cy Rn St	WSW
7	29	8	⊙ Rn	29	7	Rn ⊙	29	7½	Cy Cd Wd	WSW
8	29	6	Cy ⊙ Rn Cd	29	5	Rn Wd	29	5½	Cy Cd Wd	WSW
9	29	5	Dk ⊙	29	7½	Cy Rn	29	9	Dk Cd	WSW
10	29	9½	⊙	29	10	⊙	29	9	Dk Cd Wd	E
11	29	7	Cy Rn	29	6½	⊙ Dk	29	5½	Cy Rn	SSE
12	29	2	Wd ⊙ Rn	29	½	Wd ⊙ Rn	29	8½	Cy Rn	WSW
13	29	11	⊙ Wd	29	11¾	⊙ Wd	29	11	Dk Wd Cd	SW
14	29	11	Dk ⊙ Rn	29	12	Cy ⊙ Wd	29	12½	Rn Cd Wd	SW
15	29	13½	Cy Rn ⊙	29	16½	⊙ Wm	30		Dk Cd	WSW
16	29	18½	Cy Rn	29	17	⊙	29	17	Dk Cy	SW
17	29	15	Rn	29	15	Cy Rn	29	16	Dk	W
18	29	17	Dk ⊙	29	17	⊙	29	15	Dk	S
19	29	13½	Dk ⊙ Cy	29	14½	Cy Rn	29	14	Cy Dk	S
20	29	12½	Rn Fg	29	12	Dk ⊙	29	10½	Dk	E
21	29	10	⊙ Cy	29	11	Cy ⊙	29	12	Dk	E
22	29	12	⊙ Cy	29	11½	Cy	29	12	Cy	E
23	29	10	Dk ⊙	29	9	⊙ Wd	29	7½	Wd Cd	E
24	29	7½	Cy Rn	29	7½	Rn Cy	29	8	Cy Cd	ESE
25	29	8	⊙	29	9	⊙ Cy Rn	29	8½	Cy Rn	E
26	29	8	Dk Cy	29	8	Dk ⊙	29	8	Cy Cd	E
27	29	6	Cy Rn	29	6	Cy Rn Cd	29	6	Cy Cd	WNW
28	29	5½	⊙ Rn Hl	29	5	⊙ Rn Hl	29	7	Cd Cy Rn	WNW
29	29	10	⊙ Hl Cd	29	12½	Hl Cd Rn	29	15½	Hl Rn Cd	NW
30	29	14½	Cd ⊙ Cy	29	13	Cy Rn	29	11½	Cy Rn Cd	WSW

A Journal

A Journal of the Weather in *Dublin* for the Year 1755.

MAY 1755.

D.	Morning.		Noon.		Night.		Wind.
1	29 10	Cy Rn	29 10½	Cy ⊙ Rn	29 9	Cy Rn	WSW
2	29 7½	Rn Cd	29 8	Rn Cd	29 11	Cd Rn	NE
3	29 13½	⊙ Cd	29 14½	⊙ Rn Hl	29 15½	Dk Cd Hl	N
4	29 15	Cd Cy ⊙	29 14	⊙ Cy Rn	29 13	Dk Cd Wd	WSW
5	29 11½	Cy Rn ⊙	29 11	⊙ Rn Wd	29 10½	Cy Cd	WSW
6	29 7	⊙ Hl Rn	29 7½	Rn Hl ⊙ Wd	29 9½	Cy Cd	WSW
7	29 10½	⊙ Hl Rn	29 11	⊙ Hl Rn	29 14	Fr Cd	NW
8	29 14½	Cy Rn	29 16½	Cy Hl Rn	29 18½	Cy	NW
9	29 18½	Fr	29 18	⊙	29 16	Dk	Var.
10	29 14	⊙	29 14	⊙ Rn	29 14	Cd Fg	WNW
11	29 13	⊙	29 11	⊙ Rn	29 11	Cd Cy Rn	W
12	29 11	Cy ⊙	29 12	Rn Hl Thd	29 14	Cy Rn Hl	Var.
13	29 15½	Cy ⊙	29 16½	⊙ Cy Wm	29 17½	Wm Fg	NE
14	29 16	Fr ⊙	29 15	Cy ⊙	29 13	Cy Rn	SSE
15	29 11	Cy Rn	29 11	Cy ⊙ Rn	29 14½	Cy	W
16	29 11½	Fr ⊙	29 17	⊙ Cy Rn	29 17¾	Cy Rn Cd	WNW
17	29 18½	Cy ⊙	30	⊙	30 2½	Cd	NNW
18	30 3½	⊙	30 4	⊙ Wm	30 4½	Fr Rn	WNW
19	30 3½	Dk ⊙	30 4	Cy Rn ⊙	30 4	Fr	WNW
20	30 3	⊙ Cy	30 3	Cy ⊙ Wm	30 2½	Fr	W. NW
21	30 2	Cy ⊙	30 2½	Cy ⊙ Wm	30 2½	Fr	NW
22	29 18	Dk ⊙	30 3½	Dk Wm	30 3½	Fr	N
23	30 3½	⊙	30 4	⊙ Wm	30 3½	Fr	N
24	30 3	Dk ⊙	30 2½	⊙	30 2	Cy Cd	N
25	30 1	⊙ Cy Cd	30 1½	⊙ Cy Cd	30 2	Cy Cd	ENE
26	30	⊙ Cy	29 19½	Cy	29 19	Dk	NE
27	29 18½	⊙ Cy	29 17½	⊙ Wm Wd	29 17½	Rn Cy	W
28	29 19½	⊙ Wd Cy	30 ½	⊙	30 2	Fr	NW
29	30 ½	⊙	29 19	⊙ Cy	29 16½	Rn Cy	WSW
30	29 12	Cy Rn	29 9½	Rn	29 9½	Rn	Var.
31	29 9½	Cy ⊙	29 9½	⊙ Cy	29 12	Cy	WNW

A Journal

A Journal of the Weather in *Dublin* for the Year 1755.

JUNE 1755.

Ds	Morning.		Noon.		Night.		Wind.
1	29 13	⊙ Cy	29 13	⊙	29 16	Fr Cd	SE
2	29 17	⊙	29 18	⊙	29 18½	Fr Cd	E
3	29 18	Dk ⊙	29 19	⊙ Wm	29 19	Fr Rn	ENE
4	29 18	⊙	29 18	⊙ Wm	29 17	Fr Cd Wd	NE
5	29 16½	⊙	29 15½	⊙ Cy	29 14½	Rn Cy	NE
6	29 14	Cy Rn	29 13½	⊙ Rn	29 13	Cy	E
7	29 13	Rn Thd	29 13	Rn	29 13	Cy	E
8	29 13½	Cy ⊙ Rn	29 13	Rn ⊙ Cy	29 14	Fr	W
9	29 14	Dk	29 13¾	Cy Rn	29 14	Cy	E
10	29 14½	Dk	29 15½	Dk Cd	29 17	Cy Cd	NE
11	29 17¼	⊙	29 18	⊙	29 17½	Fr Cd	ENE
12	29 17½	Dk ⊙ Wm	29 16	⊙ Wm	29 15	Fr Cd	E
13	29 12¾	Cy Rn	29 12	Cy Rn ⊙	29 12	Cy	ESE
14	29 12	⊙ Wd	29 12½	⊙ Wd	29 11	Cy Rn	ESE
15	29 10	Cy Cd	29 10½	⊙ Rn Wd	29 11	Cy	SE
16	29 11	⊙	29 13	Dk	29 14½	Rn	WSW
17	29 14	Cy Rn	29 15½	⊙ Cy Wd	29 18½	Fr Wd	W
18	29 18	⊙ Rn	29 15	Cy Rn	29 14	Cy Rn	S
19	29 13	Cy ⊙	29 13½	Rn Cy	29 14½	Cy	S
20	29 15	⊙	29 15	⊙	29 16½	Fr	W
21	29 17	⊙	29 17	⊙ Wm	29 16	Fr	ENE
22	29 14½	Cy	29 12	Cy	29 8	Rn	SE
23	29 7½	⊙ Rn	29 7½	⊙ Rn	29 6½	Rn Cy	Var.
24	29 9	Cy Rn ⊙	29 9½	⊙	29 13	Fr	NNE
25	29 14¼	⊙	29 16	⊙	29 15	Fr	Var.
26	29 14	⊙	29 13	Cy	29 12	Rn Cy	ESE
27	29 12	Cy ⊙	29 12	Cy	29 11	Rn Cy	W
28	29 10½	Cy ⊙	29 11	Rn ⊙	29 11	Rn Cy	Var.
29	29 13	⊙	29 12	⊙ Cy	29 5	Rn	Var.
30	29	Cy Rn	29	Cy Rn	29 1½	Rn Cy	Var.

A Journal of the Weather in *Dublin* for the Year 1755.

JULY 1755.

Ds	Morning.		Noon.		Night.		Wind.
1	29 3	Cy Rn	29 4½	Cy Wd ⊙	29 7½	Cy	NW
2	29 9	⊙ Cy	29 9½	⊙ Cy Rn	29 9	Cy Cd	WNW
3	29 10	Cy ⊙ Rn	29 12	⊖ Cy	29 14½	Fr	WNW
4	29 14	⊙	29 14½	⊙	29 14½	Cy	SW
5	29 14½	Rn ⊙	29 14½	Rn ⊙	29 15	Cy	SW
6	29 14½	Rn ⊙	29 16	Rn ⊙	29 18	Rn	Var.
7	29 18½	Cy ⊙	29 19½	⊙	30	Cy	Var.
8	30	⊙	29 19½	⊙ Cy	29 16½	Cy Cd Rn	Var.
9	29 12½	Cy Rn	29 11½	Cy Rn	29 8½	Rn	W
10	29	Rn Cy ⊙	29	Rn Cy St	29 1	Rn St	WSW
11	29 5	⊙	29 7	⊙ Cy	29 10	Rn Cy Cd	WSW
12	29 11	Dk ⊙ Rn	29 11	Cy ⊙ Rn	29 10	Cy Cd	ESE
13	29 10	Cy ⊙	20 10	⊙ Cy Wm	29 11	Cy Cd	WSW
14	29 11	Cy ⊙ Rn	29 11½	Rn ⊙	29 11	Rn	SSW
15	29 11½	Cy ⊙	29 11½	Cy ⊙ Wm	29 11	Cy Wd Rn	ESE
16	29 10	Cy ⊙ Rn	29 12	⊙	29 13½	Cy	WSW
17	29 13½	Dk	29 12½	Dk Rn	29 6½	Rn Wd Cd	Var.
18	29 4½	Cy Rn St	29 10	Cy Wd ⊙	29 17	Fr Wm	WNW
19	29 17½	Cy Rn	29 17	Rn	29 14	Rn Cy Cd	Var.
20	29 14½	Dk ⊙	29 14¾	⊙ Cy Wd	29 15	Cy Wd Cd	W
21	29 13	Rn	29 10½	Rn ⊙	29 10	Rn Cy	E
22	29 9½	Cy ⊙	29 10	Cy ⊙	29 11	Cy	NW
23	29 11	Cy ⊙	29 12½	⊙	29 12½	Cy	E
24	29 13	⊙ Rn	29 14	Cy ⊙	29 15½	Dk Cd	NE
25	29 15	Cy Rn	29 16	Cy ⊙	29 14½	Cy Cd	NNW
26	29 12½	Dk ⊙	29 12½	Cy	29 13	Cy Cd	NW
27	29 15	⊙	29 16½	⊙	29 19	Fr	N
28	29 18	Cy	29 17	Cy	29 15	Rn Cy	W
29	29 12	Cy Rn ⊙	29 13½	⊙	29 14½	Cy Wd	W
30	29 15½	Dk ⊙	29 17	Dk ⊙	29 18½	Fr	WNW
31	29 18	⊙	29 18	⊙	29 17	Fr	WNW

A Journal

A Journal of the Weather in *Dublin* for the Year 1755.

AUGUST 1755.

D[e]	Morning.		Noon.		Night.		Wind.
1	29 16	⊙ Rn	29 10	Rn Wd	29 16	Rn Cy	W
2	29 15	Cy ⊙	29 14	⊙ Cy Rn	29 11	Rn Cy	W
3	29 7	Cy ⊙ Cd	29 6	Hl Rn ⊙	29 7½	Hl Rn Cd	NW
4	29 9	Cy Cd	29 11	Cy Cd	29 13	Cy Cd	NW
5	29 14	⊙ Cd	29 15	Cy Cd	29 17	Dk Cd	NNW
6	29 17	Dk Cd	29 17½	⊙ Wm	29 18	Cy	N
7	29 18½	Dk ⊙ Ht	29 19	⊙ Ht	29 19	Fr	ENE
8	29 18½	Dk ⊙ Rn	29 18½	Rn ⊙	29 19½	Fr	Var.
9	30	Dk ⊙ Rn	30	Cy	30 1½	Fr	NW
10	30 1½	⊙	30 1½	⊙ Ht	30 1½	Fr	ENE
11	30	⊙	29 19¾	⊙ Ht	29 18¾	Cy	E
12	29 17	⊙	29 16	⊙ Rn	29 15	Cy	E
13	29 14	Cy Rn	29 14	⊙ Cy	29 14	Fr	E
14	29 13½	Cy ⊙	29 13	Cy	29 12	Cy Wd	ESE
15	29 10	Rn	29 8½	⊙	29 8½	Rn CyWd	ESE
16	29 9	Cy ⊙	29 8½	⊙ Ht	29 7½	Rn	SE
17	29 11	⊙ Wd	29 13	⊙ Wd	29 14½	Cy Wd	SW
18	29 14½	Cy ⊙	29 14½	⊙ Ht	29 11½	Cy Wd	SSE
19	29 7	Cy Rn	29 8½	Rn ⊙	29 11	Cy Cd	W
20	29 13	⊙ Cy	29 13½	Cy	29 13½	Cy Cd	W
21	29 12½	Cy Rn	29 10	Rn	29 12	Cy	W
22	29 12½	⊙ Rn	29 13	⊙ Rn	29 13½	Cy Cd	W
23	29 13	Cy ⊙	29 12½	⊙ RnWd	29 13	Cy Wd	W
24	29 12½	Cy RnWd	29 14	⊙ Cy Wd	29 15½	Rn Wd	W
25	29 15½	Cy Dk	29 17½	Dk	29 18½	Cy	WNW
26	29 19½	Dk ⊙	30 0	⊙	29 19½	Cy	NW
27	29 19½	Cy Rn	29 19½	⊙ Cy	29 19½	Cy	NNW
28	29 18½	Dk ⊙	29 15½	Rn ⊙	29 13½	Rn	WNW
29	29 13½	Rn	29 15	⊙	29 16	Cy	WNW
30	29 14	Cy Cd	29 11	Cy Cd Rn	29 5	Cy Cd	SSE
31	29 4½	Cy Wd	29 5	Cy Rn ⊙	29 1	Cy St	W

A Journal of the Weather in *Dublin*, for the Year 1755.

SEPTEMBER 1755.

D[s]	Morning.		Noon.		Night.		Wind.
1	28 10	Rn St	28 12	Rn Wd	28 18	Rn Wd	WNW
2	29 6	Rn Wd ⊙	29 10½	Cy Wd	29 15	Fr	Var.
3	29 15½	⊙	29 13½	Rn	29 11	Cy	NW
4	29 10	Cy ⊙	29 10½	⊙ Cy	29 13½	Fr	W
5	29 13	Rn	29 13½	Rn	29 14	Cy	SSE
6	29 16	Cy ⊙	29 17	⊙ Cy	29 17	Cy	WNW
7	29 18	⊙ Rn	29 17½	⊙ Wd	29 19	Cy	W
8	29 18½	Dk ⊙	29 17½	⊙	29 16½	Cy	W
9	29 13½	⊙ Wd	29 14½	Wd Rn	29 18	Fr Cd	NW
10	29 19	Dk ⊙ Cd	29 19	⊙ Dk Cd	29 19½	Cd Fr	NW
11	29 16½	Dk ⊙ Cd	29 16	⊙ Cd Rn	29 15½	Cy Cd	Var.
12	29 14½	Rn ⊙	29 14½	⊙ Dk	29 15	Cy	WSW
13	29 16½	Cy ⊙	29 17	Cy ⊙	29 17	Dk	W
14	29 17½	⊙	29 16½	⊙	29 16	Cy	W
15	29 14½	⊙	29 13½	⊙	29 13	Cy	SSE
16	29 15	⊙	29 15	⊙	29 16	Fg	SE
17	29 13½	Dk	29 13	Dk ⊙ Wd	29 13½	Cy	SE
18	29 12½	Cy Rn	29 12½	Rn	29 12	Rn	SSE
19	29 11	Rn	29 11	Rn	29 13½	Fr Wd	E
20	29 13	⊙	29 13	⊙	29 12½	Rn Wd	E
21	29 10	Rn Wd	29 10	Cy	29 11	Cy	ESE
22	29 11	Cy	29 10	Cy	29 10¾	Cy	ENE
23	29 10	Rn	29 10½	Cy	29 12	Cy	ENE
24	29 12½	Cy	29 14	⊙	29 14½	Fg	SE
25	29 14½	⊙	29 13	Cy	29 11	Cy	S
26	29 3	St Rn	29 3	Cy Rn	29 2¾	Cy	SW
27	29 1½	⊙	29 2½	⊙	29 5½	Fr	WNW
28	29 8	⊙	29 8	⊙	29 4	St Rn	S
29	28 17½	⊙ Rn	28 17½	⊙ Rn	29 2	Wd Cy	SW
30	29 4½	Cy Rn	28 19½	Rn	28 18½	Rn St	WSW

A Journal

A Journal of the Weather in *Dublin* for the Year 1755.

OCTOBER 1755.

D[s]	Morning.		Noon.		Night.		Wind.
1	29 5	⊙	29 9	⊙ Rn	29 11½	Fr Wd Cd	Var.
2	29 10	Cy Rn	29 10	Rn	29 5	Rn Cy	WSW
3	29 2½	Cy	29 6	Cy ⊙	29 9½	Fr Cd	Var.
4	29 10	Rn ⊙	29 12	⊙ Wm	29 13½	Fr	W
5	29 14½	⊙	29 14½	⊙ Wm	29 15	Cy Wm	Var.
6	29 17	⊙	29 16½	⊙ Cy	29 16	Fr Cd	WSW
7	29 14½	Cy Rn	29 15½	⊙	29 17½	Fr Wm	W by S
8	29 18½	⊙	29 18½	⊙	29 16½	Wd	SW
9	29 11½	⊙ Wd Rn	29 11	⊙ RnWd	29 13	Fr Wd Cd	WSW
10	29 12½	Wd ⊙	29 13	Wd Rn ⊙	29 15	Fr Wd Cd	WNW
11	29 16½	⊙ Cd Wd	29 16½	WdCd Hl ⊙	29 17½	Ft	WNW
12	29 17	⊙ Cd	29 18½	⊙ Cd	29 19½	Cd Fg	NNE
13	29 19½	⊙	29 19½	⊙	30	Cd Fg	Var.
14	29 17½	Fg ⊙	29 15½	⊙	29 12½	Fg Cd	Var.
15	29 8	Fg Rn	29 6	⊙ Rn	29 3½	Rn	WSW
16	29 1½	Rn Fg	29 ½	⊙	29 3	Cy Cd	W
17	29 8½	Cd Fg ⊙	29 10½	⊙	29 12¾	Cd	ENE
18	29 12½	Dk Cd ⊙	29 13	⊙ Dk Cd	29 12½	Cd	ENE
19	29 13	Cy Rn	29 13½	Cy ⊙	29 16	Fr	ENE
20	29 16¾	Dk Cd Ft	29 17½	Dk ⊙	29 18	Fr Fg	WNW
21	29 18	⊙	29 17	⊙	29 15½	Cd Fg	WNW
22	29 12½	⊙	29 12½	⊙ Cy Rn	29 13	Cy	WNW
23	29 15	⊙ Cd Ft	29 13½	⊙ Rn	29 8½	Rn CdWd	WNW
24	29 7½	⊙ Wd Cd	29 8½	⊙ CyWd Cd	29 14½	Cy Cd Wd	WNW
25	29 17	⊙ Wd	29 19½	⊙ Rn Cd	30 2	Cy CdWd	WNW
26	30 1	Dk ⊙ Cd	30	⊙ Cd	30	Dk Cd	W
27	30	⊙	30 1	⊙	30 2	Fr	W
28	30 2¾	Dk	30 2½	Dk Fg	30 3	Fg	Var.
29	30 3	Dk Fg	30 4	Dk	30 5	Fg	W
30	30 5	Fg Dk	30 5	Dk	30 5	Fg	Var.
31	30 4½	Fg ⊙	30 5	Dk	30 5¼	Fg	Var.

A Journal

A Journal of the Weather in *Dublin*, for the Year 1755.

NOVEMBER 1755.

D.	Morning.		Noon.		Night.		Wind.
1	30 5	Fg Dk Cd	30 4	Dk	30 3	Fg Cd	W
2	29 19	Cy Wd	29 19	Cy	29 17½	Cy Wd	WSW
3	29 15	Cy Wd	29 14¾	Rn Cy Wd	29 16	Cy Cd Wd	W by S
4	29 14	Cy Fg ⊙	29 11½	⊙	29 10	Cy Cd	W
5	29 4½	Cy Cd	29 5	Cy ⊙ Cd	29 8	Fr Cd	WNW
6	29 11	Cy Fg	29 11½	⊙ Cd	29 12	Fg Cd Wd	WNW
7	29 7½	Dk Fg Ft	29 3½	Sw Rn	29 2	Sw Rn Wd	E
8	28 18	Cy Wd Hl	28 19½	Hl Rn Wd	29 2¾	Rn Cd Wd	NE
9	29 5	Fg Ft ⊙	29 5	⊙ Cd	29 7	Cd	WNW
10	29 5	Fg Ft Sw	29 5	Dk Cd	29 6½	Cd	NW
11	29 11½	Fg Cd	29 12	Dk Cd Rn	29 10	Cd	W
12	29 7	Dk Cd ⊙	29 5	⊙ Cy	29 4½	Rn	WNW
13	28 17	Cy Rn	28 13½	Rn ⊙	28 12	Rn Cy	Var.
14	28 14½	Cy Rn Wd	28 18¼	Cy Wd ⊙	29 3	Fr Cd	NNW
15	29 6	Dk Ft	29 7	Dk ⊙ Cd	29 8½	Fg Cd	WNW
16	29	Cy Rn St	28 13½	Rn St	28 13¾	Cy Wd	SW
17	28 11½	Cy ⊙	28 9½	Cy ⊙	28 6½	Fr Wd	SSW
18	28 9½	Cy St	28 11¾	Cy Rn Wd	28 14½	Cy Cd Wd	WSW
19	28 14½	Cy	28 14	Cy Rn	28 16	Cy Cd	WSW
20	28 18¾	Cy ⊙	29 2½	Cy ⊙	29 7¾	Cy Rn	W
21	29 2½	Cy ⊙ Rn	29 4½	⊙ Cy	29 6½	Cy	WSW
22	29 2	Cy Rn	29 2½	Cy ⊙ Hl	29 2½	Rn St Cd	WSW
23	28 18½	St Rn Cy	28 17½	Rn Hl Wd	29 1	Rn Cd Wd	WSW
24	29 4	Cy	29 4	Cy	29	Cy	Var.
25	29	Cy ⊙	29 1	Cy ⊙ Cd	29 4	Cy Cd	NNW
26	29 6½	Dk Ft	29 8½	Cy Cd	29 11	Cy Cd	NW
27	29 14½	Fg Ft	29 15	Cy Cd ⊙	29 15¾	Cy Cd	NW
28	29 16½	Fg Ft	29 17	Dk Sw	29 17¾	Hl Rn Cd	NNW
29	29 18	Fg Ft ⊙	29 18	⊙ Dk Ft	29 19	Sw Fg	NW
30	29 16½	Fg Cd	29 15	Dk Cd	29 13½	Fg Cd	WNW

A Journal

A Journal of the Weather in *Dublin* for the Year 1755.

DECEMBER 1755.

D[s]	Morning.		Noon.		Night.		Wind.
1	29 5½	Cy Rn ⊙	29 3½	⊙ Cy	29 5½	Cy Rn Hl	W
2	29 10	Cy Rn ⊙	29 11	⊙ Cy	29 13½	Cy Rn	NNE
3	29 13½	Fg Cd	29 13½	Cy Cd	29 11½	Rn	W
4	29 13½	Cy Cd	29 14½	Cy ⊙	29 17	Cy	NW
5	29 19	Ft ⊙	29 19½	⊙ Cd Dk	30	Fg Ft	NE
6	29 19½	Fg Ft ⊙	29 19½	⊙ Ft	29 18½	Cy	WSW
7	29 15	Cy Rn	29 16	Rn	29 15½	Rn	W
8	29 14½	Rn Cy	29 14½	Rn Cy	29 14¾	Cy Wd	WSW
9	29 13	Cy	29 10½	⊙ Rn Wd	29 9	Rn	WSW
10	29 11½	Cy ⊙	29 12½	⊙ Cy	29 12½	Cy	WSW
11	29 9½	Fg Rn	29 7½	Rn Cy	29 9½	Cy	NNE
12	29 13	⊙ Ft Cd	29 14	⊙ Cd	29 14½	Ft	W
13	29 9½	Dk CyRn	29 5	Rn	29 8½	Cy	SSE
14	29 6	Dk Cy	29 4	Rn Sw	29 7	Ft	SSE
15	29 4½	Cy Rn Ft	28 17	Rn St	28 12¾	Wd RnCy	SE
16	28 14½	Rn Wd ⊙	28 15	Wd ⊙ Cy	28 15½	Cy	WSW
17	28 14½	Cy	28 14	Cy	28 14	Cy Cd	ESE
18	28 17½	† Fg ⊙	28 19	⊙	29 1¼	Cy	S
19	29	Fg ⊙	28 18½	⊙	28 17½	Rn Ft	SSW
20	28 18½	⊙ Wd Ft	28 19	⊙ Wd Cd	29	Wd flaſhes	WSW
21	29 ½	⊙ Wd Rn	29 1	⊙ Wd Rn	29 6½	Cy	W
22	29 14½	⊙ Ft Fg	29 15	Dk ⊙	29 14	Fg Rn	WSW
23	29 12	Fg ⊙	29 15	⊙	29 16½	Fg	WSW
24	29 17½	Fg ⊙	29 15	Dk	29 11	Rn Wd	WSW
25	29 11½	⊙	29 12½	⊙	29 12½	Fg	WSW
26	29 6	Dk	29 5	Dk	29 4½	Dk St	SW
27	29 6	Cy ⊙ Wd	29 5	⊙ Wd Cy	29 5¼	Rn St	SW
28	29 4	Cy St ⊙	29 5½	⊙ Hl Sw Rn	29 6½	St Cd	WSW
29	29 7¼	⊙ Wd	29 8	⊙ Wd	29 9½	Wd Cd	WSW
30	29 14	⊙ Fg	29 15	⊙	29 17½	Fg	WSW
31	29 16	Rn ⊙	29 14½	Cy ⊙	29 14¾	Fg	WSW

† The 18th at 4 o'Clock P. M. a red Light like Fire.

CXI. *An Account of what happened at* Bergemoletto, *by the tumbling down of vaſt Heaps of Snow from the* * *Mountains there, on* March 19, 1755: *As taken by the Intendant of the Town and Province of* Cuneo. *Received from Dr.* Joſeph Bruni, *Profeſſor of Philoſophy at* Turin, *and F. R. S. Communicated by Mr.* Henry Baker, *F. R. S. Tranſlated from the* Italian.

Read Nov. 11, 1756.

IN the neighbourhood of Demonte, as one deſcends through the upper Valley of Stura, on the left hand, about an hour and half diſtant from the road leading to the caſtle of Demonte, towards the middle of the mountain, there were ſome houſes in a place called by the inhabitants Bergemoletto, which on the 19th of March, in the morning, (there being then a great deal of ſnow) were intirely overwhelmed and ruined by two vaſt bodies of ſnow, that tumbled down from the

* A remarkable inſtance of the fall of a vaſt maſs of ſnow from the Alps, and of miſchief occaſioned by it, is mentioned by Paulus Jovius in his Life of Pompeius Columna.—" Pompeius—trans Alpes " contendit, quo itinere ſummum ſe vitæ periculum adiiſſe ſæpe " memorabat, quum ipſo Peninas ſuperante Alpes devoluta in- " gens e ſummis Alpium jugis nivium moles permultos omnis ge- " neris mortales, et in his integram Sedunorum legationem paucis " ante ſe paſſibus oppreſſiſſet."

ſides

upper mountain. All the inhabitants were then in their houſes, except one Joſeph Rochia, a man of about 50, who with his ſon a lad of 15, were on the roof of his houſe, endeavouring to clear away the ſnow, which had fallen without any intermiſſion for three preceding days. A prieſt going by to maſs adviſed him to come down, having juſt before obſerved a body of ſnow tumbling not far diſtant from the ſaid Rochia's houſe, but which being not large had done no harm. The man imagining this ſmall maſs would be followed by larger ones, got down from the roof with great precipitation, and fled with his ſon he knew not whither: but ſcarce had he got thirty or forty ſteps, before his ſon, who followed him, fell down: on which looking back, he ſaw his own houſe and thoſe of his neighbours covered with an high mountain of ſnow. He lifted up his ſon, and then reflecting that his wife, his ſiſter, two of his children, and all his effects, were buried under this vaſt heap of ſnow, he fainted away; but ſoon after recovering got ſafe to a friend's houſe.

Two-and-twenty perſons were buried under this vaſt maſs of ſnow, which was 60 Engliſh feet in height, inſomuch that many men, who were ordered to give them all poſſible aſſiſtance, deſpaired of being able to do them the leaſt ſervice.

After five days, Joſeph Rochia having recovered of his fright, and being able to work, got upon the ſnow (with his ſon, and two brothers of his wife) to try if they could find the exact place under which his houſe and ſtable were buried; but though many openings were made in the ſnow, they could not find the deſired place. However the month of

April proving very hot, the ſnow beginning to ſoften, and indeed a great deal of it melted, this unfortunate man was again encouraged to uſe his beſt endeavour to recover the effects he had in the houſe, and to bury the remains of his family. He therefore made new openings in the ſnow, and threw earth into them, which helps to melt the ſnow and ice. On the 24th of April the ſnow was greatly diminiſhed, and he conceived better hopes of finding out his houſe, by breaking the ice (which was ſix Engliſh feet thick) with iron bars, and obſerving the ſnow to be ſofter underneath the ice, he thruſt down a long pole, and thought it touched the ground; but the evening coming on he proceeded no farther.

His wife's brother, who lived at Demonte, dreamed the ſame night, that his ſiſter was ſtill alive, and begged him to help her. Affected by this dream, he roſe early in the morning, and went to Bergemoletto, where he told his dream to Joſeph and his neighbours; and, after reſting himſelf a little, went with them to work upon the ſnow, where they made another opening, which led them to the houſe they ſearched for; but finding no dead bodies in its ruins, they ſought for the ſtable, which was about 240 Engliſh feet diſtant, and having found it, they heard a cry of "Help, my dear brother." Being greatly ſurprized as well as encouraged by theſe words, they laboured with all diligence till they had made a large opening, through which the brother who had the dream immediately went down, where the ſiſter with an agonizing and feeble voice told him, "I have always truſted in God and you, that "you would not forſake me." The other brother

and

and the huſband then went down, and found ſtill alive the wife about 45, the ſiſter about 35, and a daughter about 13 years old. Theſe women they raiſed on their ſhoulders to men above, who pulled them up, as it were from the grave, and carried them to a neighbouring houſe: they were unable to walk, and ſo waſted that they appeared like mere ſhadows. They were immediately put to bed, and gruel made with rye-flour and a little butter was given to recover them. Some days after the Intendant came to ſee them, and found the wife ſtill unable to riſe from her bed, or uſe her feet, from the intenſe cold ſhe had endured, and the uneaſineſs of the poſture ſhe had been in. The ſiſter, whoſe legs had been bathed with hot wine, could walk with ſome difficulty; and the daughter needed no farther remedies, for ſhe was quite recovered.

On the Intendant's interrogating the women, they told him, that their appetite was not yet returned; that the little food they eat (excepting broths and gruels) lay heavy on their ſtomachs, and that the moderate uſe of wine had done them great good: they alſo gave him the account that follows.

In the morning of the 19th of March we were in the ſtable, with a boy 6 years old and a girl about 13: in the ſame ſtable were 6 goats, one of which having brought forth 2 dead kids the evening before, we went to carry her a ſmall veſſel full of rye-flour gruel; there were alſo an aſs and 5 or 6 fowls. We were ſheltering ourſelves in a warm corner of the ſtable till the church bell ſhould ring, intending to attend the ſervice.

The wife relates, that wanting to go out of the ſtable to kindle a fire in the houſe for her huſband, who was

then clearing away the ſnow from the top thereof, ſhe perceived a maſs of ſnow breaking down towards the eaſt, on which ſhe went back into the ſtable, ſhut the door, and told her ſiſter of it. In leſs than three minutes they heard the roof break over their heads, and alſo part of the ceiling of the ſtable. The ſiſter adviſed her to get into the rack and manger, which ſhe did very carefully. The aſs was tied to the manger, but got looſe by kicking and ſtruggling, and though it did not break the manger, it threw down the little veſſel, which the ſiſter took up, and uſed afterwards to hold the melted ſnow which ſerved them for drink.

Very fortunately the manger was under the main prop of the ſtable, and thereby reſiſted the weight of the ſnow. Their firſt care was to know what they had to eat: the ſiſter ſaid, ſhe had in her pocket fifteen white cheſnuts: the children ſaid they had breakfaſted, and ſhould want no more that day. They remembered there were 30 or 40 loaves in a place near the ſtable, and endeavoured to get at them, but were not able, by reaſon of the vaſt quantity of ſnow. On this they called out for help as loudly as they poſſibly could, but were heard by nobody. The ſiſter came again to the manger, after ſhe had tried in vain to come at the loaves, gave two cheſnuts to the wife, and eat two herſelf, and they drank ſome ſnow water. All this while the aſs was very reſtleſs and continued kicking, and the goats bleated very much, but ſoon after they heard no more of them. Two of the goats however were left alive, and were near the manger; they felt them very carefully, and knew by ſo doing that one of

them was big, and would kid about the middle of April; the other gave milk, wherewith they preſerved their lives.

The women affirmed, that during all the time they were thus buried, they ſaw not one ray of light, nevertheleſs for about twenty days they had ſome notion of night and day; for when the fowls crowed they imagined it was break of day: but at laſt the fowls died.

The ſecond day, being very hungry, they eat all the remaining cheſnuts, and drank what milk the milch goat yielded, which for the firſt days was near two pounds a day, but the quantity decreaſed gradually.

The third day, being very hungry, they again endeavoured to get to the place where the loaves were, near the ſtable, but they could not penetrate to it through the ſnow. They then reſolved to take all poſſible care to feed the goats, as very fortunately over the ceiling of the ſtable, and juſt above the manger, there was an hayloft with a hole through which the hay was put down into the rack. This opening was near the ſiſter, who pulled down the hay and gave it to the goats as long as ſhe could reach it, which when ſhe could no longer do, the goats climbed upon her ſhoulders, and reached it themſelves.

On the ſixth day the boy ſickened, complaining of moſt violent pains in the ſtomach, and his illneſs continued ſix days, on the laſt of which he deſired his mother, who all this time had held him in her lap, to lay him at his length in the manger. She did ſo, and taking him by the hand felt it was very cold; ſhe then put her hand to his mouth, and finding

finding it likewiſe very cold, ſhe gave him a little milk; the boy then cried, "O my father in the ſnow! Oh! father! father!" and then expired.

The mother told the ſiſter the boy was dead, and then laid him in the manger near where the ſiſter was. In the mean while the quantity of milk given by the goat diminiſhed daily, and the fowls being dead they could no more diſtinguiſh night and day; but according to their calculation the time was near when the other goat ſhould kid, which as they computed would happen about the middle of April; at length they found the goat was kidding by its cries: the ſiſter helped it: they killed the kid to ſave the milk for their own ſubſiſtence. And now they knew it was the middle of April. Whenever they called this goat it would come and lick their faces and hands, and gave them every day two pounds of milk, for which reaſon they ſtill bear a great affection to this ſame goat.

They ſay, during all this time, hunger gave them but little uneaſineſs, except on the firſt five or ſix days: that their greateſt pain was from the extreme coldneſs of the melted ſnow water, which fell on them, from the ſtench of the dead aſs, dead goats, fowls, from lice, &c. but more than all from the very uneaſy poſture they were obliged to continue in: for though the place in which they were buried was 12 Engliſh feet long, 8 wide, and 5 high, the manger in which they ſat ſquatting againſt the wall, was no more than 3 feet four inches broad.

For 36 days they had no evacuation by ſtool after the firſt days: the melted ſnow water (which after ſome time they drank without doing them harm) was diſcharged

charged by urine. The mother ſaid ſhe had never ſlept, but the ſiſter and daugher declare they ſlept as uſual. The mother and ſiſter ſay, that on the day they were buried their monthly evacuations were upon them, but they had not the leaſt ſign of them afterwards.

The above account was atteſted by the ſaid women before the Intendant on the 16th of May, 1755.

CXII. *An Account of ſome of the more rare* Engliſh *Plants obſerved in* Leiceſterſhire.

To the Earl of *Macclesfield*, Preſident of the ROYAL SOCIETY.

My Lord,

Read Nov. 25, 1756. I Take the liberty, by your lordſhip's means, of communicating to the Royal Society an account of ſome of the more rare plants, growing ſpontaneouſly in Leiceſterſhire, tranſmitted to me by its author, Mr. Richard Pultney, an apothecary at Leiceſter. Mr. Pultney is a perſon of real merit, well ſkilled not only in whatever relates to his profeſſion, but alſo in various parts of Natural Hiſtory. His botanical knowlege is very extenſive, and he is very zealous in promoting it. He has already laid before the pubiic, though his modeſty would not permit

permit him to ſubſcribe his name thereto, a ſeries of very curious and uſeful obſervations upon the vegetable poiſons growing in England; the knowlege of which cannot be too much or too generally inculcated.

The plants in the work, now put into your lordſhip's hands, are diſpoſed according to the ſexual ſyſtem of Dr. Linnæus, a very worthy member of this Society: but our author has not contented himſelf with a ſimple arrangement of the plants, the ſubject of his work; he has gone further, and has given us not only the ſynonymes of ſome of the beſt authors, but as far as his reading and obſervations have enabled him, their medical and œconomical uſes and their places of growth.

Nothing can more tend to the advancement of the natural hiſtory of this kingdom, than that perſons converſant in the various parts of it, ſhould collect the productions of their own neighbourhood, and tranſmit accounts thereof to the Royal Society. How much correſpondence of this kind has already done, nothing can give a ſtronger teſtimony than the Synopſis Stirpium Britannicarum of the late Mr. Ray; as this, joined to his own induſtry, enabled Mr. Ray to communicate to the public a more perfect account of the plants of this country than any other nation has yet ſeen.

I ſhall make no apology for troubling your lordſhip with this, as I am well appriſed how ſure every performance is to meet with your lordſhip's patronage, which tends to promote the ends of the inſtitution of that Society, over which you ſo very worthily preſide.

I have

I have the honour to be with the greateſt deference and regard,

My Lord,

Your Lordſhip's moſt obliged,

Lincolns-Inn-Fields,
Nov. 24, 1756.

and obedient Servant,

W. Watſon.

Stirpium rariorum in agro Leiceſtrenſi ſponte naſcentium Sylloge.

Ejuſmodi *Floræ*, ita haud parvo quidem ſunt ſubſidio incolis aliiſque qui intra ejuſdem regionis plagas degunt, plantaſque iſtius terræ ſibi familiares reddere geſtiunt: Deinceps in illis itidem videre licet, quaſnam et quam diverſas quævis terra gignat producatque plantas pro ratione *Situs* atque *Soli*, unde uti Regionum, ita et plantarum mutua et haud parva differentia originem trahat ſui.

Linn. Flor. Anglica.

MONANDRIA.

monogynia.

HIPPURIS Linn. Gener. Plantar.
Edit. 5ta. No. 11.

Hippuris. Flor. Lapp. N°. 1 Flor. Suec. N°. 2. Sp. Pl. p. 4.
Limnopeuce Cord. Vaill. Raii Syn. Ed. 3. p. 136. Haller Helv. p. 197.

Equiſetum paluſtre brevioribus foliis polyſpermon. C. B. pin. 15. *Female Horſetail.*

In ſtagnant and ſlow-running waters and in marſhy places. This elegant plant is not common in theſe parts. It is found in the river Soar, near Loughborough; alſo in a little brook near the ſeat of the Rev. Granville Wheler, Eſquire, at Weſt Leke Nottinghamſhire.

This plant was ſoon diſcovered by the botaniſts, after the revival of learning, but they were at a great loſs whither to refer it. Many of them took it for the Polygonum or Sanguinaria fæmina of Dioſcorides: at length it fell among the Equiſeta or Horſetails; till Ruppius, Dillenius, and Vaillant, finding its parts of fructification very different from the Horſetails, called it by a different name, the former adopting the word Pinaſtella, and two the latter the old name Limnopeuce.

The flower of this plant is perhaps the moſt ſimple in all nature. It has neither Calyx nor Petal, but conſiſts only of one Stamen and one Piſtil, followed by a ſingle ſeed.

DIANDRIA

monogynia.

VERONICA Linn. Gen. Plant. N°. 25.

Veronica ſpicis lateralibus pedunculatis, foliis oppoſitis, caule procumbente Mat. Med. 11. Sp. Plant. 11.

Veronica mas ſupina et vulgatiſſima C. B. 246. Raii Syn. 281.

Male

Male Speedwell, or Fluellin, or True Paul's Betony.

On dry barren Grounds, eſpecially upon heaths, flowering in June. Upon Charley Foreſt ſparingly. In Garenton Park. Upon the old walls in and about Buddon Wood near Quarndon.

This is the true Veronica of the ſhops, which ſtands ſo well recommended by Hoffman, Boerhaave, and others, as an excellent and approved Deobſtruent. What is ſold for it in the ſhops here in the country, by the common herb-gatherers is the Veronica pratenſis minor of Gerard and Parkinſon, called Little or Smooth Fluellin or Paul's Betony, which is abundantly more common than the true ſort. It is not long ſince the Veronica was a faſhionable remedy for the gout, ſome taking it in the form of tea, and others the powder of the dried leaves.

Veronica, racemis lateralibus, pedicellis pendulis, foliis linearibus integerrimis. Flor. Suec. 9. Sp. Plant. 12.

Veronica aquatica anguſtifolia minor : Raii Syn. 280.

Anagallis aquatica anguſtifolia ſcutellata C. B. p. 252.

Narrow leaved Water Speedwell or Brooklime.

By the banks of ditches and on the bogs flowering in May and June. This plant is very rare in theſe parts; I have only ſeen it in a moiſt place in one of the cloſes between Loughborough and Burley Hall.

PINGUICULA Gen. Plant. Plant. 28.

Pinguicula nectario cylindraceo longitudine petali. Fl. Lap. 11. Sp. Pl. 17.

Pinguicula Geſneri J. B. III. 546. Raii Syn. 289. *Butterwort or Yorkſhire Sanicle.*

In Bogs and Marſhes flowering in June. In ſeveral of the moiſt cloſes about Buddon Wood.

This plant is of a purging quality, and Parkinſon relates, that the poorer people in Wales make a ſyrup of it, which they uſe as a purge, Theat. Bot. p. 534. It was long ſince obſerved to be hurtful to the ſheep, and it appears from the reſult of the experiments in the Pan Suecus of Linnæus, that neither the horſes, goats, nor horned cattle will eat of it. Amæn. Acad. vol. ii. p. 238.

The plant is of great uſe in the Lapland Oeconomy; ſee Fl. Lappon. p. 10.

TRIANDRIA

monogynia.

SCIRPUS Gen. Plant. 62.

Scripus culmo triquetro folioſo, panicula folioſa, pedunculis nudis ſupra-decompoſitis, ſpicis confertis Fl. Suec. 38. Sp. Pl. p. 51.

Scirpus planifolius, caule triquetro, panicula foliis inſidente Haller. Helv. p. 247.

Cyperus gramineus, J. B. 2. 504. Raii Syn. 426. *Millet Cyperus Graſs.*

In watery places about ditches, brooks, ponds, &c. flowering in July and Auguſt: Plentifully in an old pond in Sir Iſaac Woolaſton's park, at Loſeby; and elſewhere, but not common.

ERIO-

ERIOPHORUM, Gen Pl. 63.

Eriophorum culmis teretibus, foliis planis ſpicatis pedunculatis. Fl. Suec. 44. Sp. Pl. 52.

Linagroſtis foliis planis ſpicis multiplicibus Hall. Helv. p. 250.

Linagroſtis, Tabern. Raii Syn. p. 435. *Cotton Graſs.*

On bogs and marſhes. Upon Charley Foreſt. In the cloſes about Woodhouſe; near Buddon Wood, and elſewhere.

Some of the poor people in Sweden for want of feathers fill their beds with the down of this graſs, Fl. Lappon. p. 18. It ſeems applicable to other oeconomical uſes; as its texture is very fine, and it may in our own country be gathered in great quantities in many places.

NARDUS, Gen Pl. 65.

Nardus ſpica ſetacea recta. Fl. Suec. 47. Sp. Plant. 53.

Gramen ſparteum juncifolium C. B. pin. R. Syn. 392. Hall. Helv. 203. *Small Matweed.*

On dry barren heaths, and ſometimes in marſhes flowering in April; almoſt all over Charley Foreſt.

Horſes and other cattle, but eſpecially the ſheep, are fond of this graſs; but it is ſeldom found among our hay, being too ſhort for the ſcythe to reach.

Digynia.

AIRA, Gen. Pl. 75.

Aira foliis ſetaceis: vaginis angulatis, floribus paniculato ſpicatis, floſculis baſi ariſtatis. It. Scan. 226. Sp. Pl. 65.

Gramen

Gramen parvum præcox panicula laxa caneſcente. R. Syn. Ed. 2. 260. Ed. 3. 407. Tab. 22. Fig. 2. bene. Pluk Alm 177 Tab. 33. Fig. 9. male.

On dry barren ground, eſpecially on gravelly ſoil, and not uncommon upon mud walls. I have obſerved it in ſeveral places about Leiceſter and Loughborough. Upon Beacon and Bardon hills, in Charley Foreſt more plentifully.

It may be called ſmall vernal graſs with a looſe whitiſh ſpike.

MELICA, Gen. Pl. 76.

Melica petalis imberbibus, panicula nutante ſimplici. Sp. Pl. p. 66.

Gramen avenaceum nemorenſe glumis rarioribus ex fuſco-xerampelinis R. Syn. 403.

Gr. avenaceum locuſtis rarioribus, C. B. p. 10.

C. Gr. avenaceum locuſtis rubris montanum C. B. p. 10. R. Syn. 403. Ex Sententia D. Doody, Linnæi, Halleri, Dalibard. *Red Oat Graſs of the Woods.*

In Buddon Wood, and here and there upon Charley Foreſt, as about Swithland ſlate-pits. It flowers in April and May.

TETRANDRIA.

monogynia.

DIPSACUS, Gen. Plant. N°. 107.

Dipſacus foliis petiolatis appendiculatis. Hort. Upſal. 25. Sp. Pl. 97.

Dipſacus capitulis hæmiſphæricis nudis. Hall. Helv. p. 672.

Dipſacus

Dipſacus minor ſeu Virga Paſtoris Ger. em. 1168. R. Syn. 192. *Small Wild Teaſel or Shepherd's Rod.*

On the banks of ditches about hedges eſpecially in moiſt and undiſturbed places, flowering in July and Auguſt.

In the lanes about Garenton Park, ſparingly. In Hollinghall Wood, near Loughborough, ſparingly. Plentifully about the old pond in Sir Iſaac Woollaſton's Park, where the Cyperus Gramineus grows.

ASPERULA, Gen. Plant. N°. 113.

Aſperula foliis octonis lanceolatis, faſciculis florum pedunculatis. Fl. Suec. 114. Sp. Plant. 103.

Aſperula Ger. 966. R. Syn. p. 224. *Herb Woodroofe.*

In mountainous woods, and under buſhes flowering in May. In Buddon, Okely, and Hollinghall Woods, near Loughborough. In the Stocking Wood near Leiceſter.

Dr. Gmelin in the Peterſburgh Acts, as he is quoted by Haller Enum. Stirp. Helv. p. 458. obſerves, that the fixed ſalt of this plant is a ſtronger alkaline than any other. The plant has a very agreable odour, and will drive away the moths. Amæn. Acad. Vol. I. p. 358.

PLANTAGO, Gen. Plant. N°. 133.

Plantago foliis linearibus dentatis, ſcapo tereti, Sp. Plant. p. 115.

Plantago foliis laciniatis Coronopus dicta, R. Syn. 315.

Coro-

Coronopus ſylveſtris hirſutior C. B. pin. 190.

On dry ſandy grounds, and on heaths flowering in July. One of the hills in Charley Foreſt, near Sheepshead, called Ives Head, is almoſt covered over with it. It grows in Preſwold Lanes, near Loughborough; alſo in a cloſe the foot-way between Quorn and the turnpike.

From the regular manner, in which the leaves of this plant are expanded upon the ground, it has been called by ſome the Star of the Earth; and much has been ſaid relating to its virtues againſt the bite of a mad dog. See Phil. Tranſ. N°. 187. alſo 457.

ALCHEMILLA, Gen. Plant. N°. 153.

Alchemilla foliis lobatis. Fl. Suec. N°. 135. Sp. Plant. p. 123.

Alchemilla Ger. 802. R. Syn. 158. *Ladies Mantle.*

In mountainous meadows and paſtures flowering in May. It is not a common plant in theſe parts; I have obſerved it upon Charley Foreſt, near Beacon Hill; and in the moiſt cloſes at Woodhouſe, near Buddon Wood.

Dr. Haller, in his Iter Helveticum, attributes the extraordinary richneſs and plenty of the milk, in ſome parts of Switzerland, chiefly to this and two other plants common on their paſtures; theſe are the narow-leaved Plantain and the Muttelina of Geſner and Camerarius. Opuſcul Botan. p. 178.

Digynia.

Cuscuta, Gen. Plant. N°. 156.

Cuſcuta floribus ſeſſilibus, Sp. Plant. p. 124.

Cuſcuta major C. B. pin. 219. R. Syn. p. 281. *Dodder.*

It is not a common plant in theſe parts. It is found upon the common nettle in ſome of the back lanes about Leiceſter.

Dodder is really the ſame plant wherever it is found; though authors have been uſed to call it by as many different names as there are different plants upon which it is found. It is ſubject to variation in the colour of the ſtalks, which at firſt are yellowiſh, afterwards purple: the colour of the flower is variable too, and theſe accidents have been the ſources of ſeveral ſpecies. M. Vaillant, though commonly averſe to the multiplication of ſpecies, yet enumerates three kinds of Dodder in the Botanicon Pariſienſe, p. 43. But Linnæus, Haller, and M. Dalibard agree in referring them all to the Cuſcuta major of Caſpar Bauhine here mentioned, which is really the only ſpecies found in Europe. Cuſcuta tingit purpuraſcente colore, Amæn. Acad. vol. I. 359.

PENTANDRIA

monogynia.

Lithospermum, Gen. Pl. N°. 166.

Lithoſpermum ſeminibus lævibus, corollis calycem vix ſuperantibus, foliis lanceolatis. Hort. Cliff. 46. Sp. Plant. p. 132.

Lithoſpermum ſeu milium ſolis J. B. III. 590. R. Syn. 228. *Gromwell, Gromil, or Gray-mill.*

In dry uncultivated places by the way-ſides, in lanes, &c. flowering in June.

This is a ſcarce plant in theſe parts: I have only ſeen it on the edge of the Foreſt about Grace Dieu Park, and there but ſparingly. The Lithoſpermum arvenſe or Baſtard Alkanet is much more common but not ſo frequent as in Lincolnſhire, where I have obſerved it among the corn about Grantham and Sleaford abundantly.

HOTTONIA, Gen. Plant. N°. 186.

Hottonia. Boerh. Ind. alt. p. 207. R. Syn. 285. Hall. Helv. 487. Sp Plant. p. 145.

Milleſolium aquaticum ſ. Viola aquatica caule nudo C. B. p. 141. *Water Violet, Water Gillover, or Gilloſlower.*

In ſtagnant and ſlow running waters and ditches flowering in April and May. Here and there in the River Soar, about Loughborough and Leiceſter but ſparingly. It continues to grow in the places mentioned by Dr. Deering in the Catalogus Nottinghamenſis.

LYSIMACHIA, Gen Plant. N°. 188.

Lyſimachia paniculata, racemis terminalibus. Sp. Plant. p. 146.

Lyſimachia lutea J. B. II. 901. R. Syn. 282. *Yellow Willow Herb, or Looſeſtrife.*

In watery places about ditches and rivers, flowering in June. This is ſcarce in theſe parts. In a moiſt

moiſt place in the outwoods near Loughborough. I obſerved it alſo about a little brook by the highway on the London road, between Northampton and Newport, about four miles from Newport.

Lyſimachia foliis ovatis acutiuſculis, pedunculis folio longioribus, caule repente, Sp. Plant. p. 148. Nummularia minor flore purpuraſcente, C. B. p. 310. Park. 555. R. Syn. p. 283. *Purple-flowered Moneywort.*

On bogs and marſhy grounds, flowering in June and July. In the boggy valleys in and about Charley Foreſt, and not ſparingly.

The Lyſimachia *nemorum* Linnæi, or Yellow Pimpernel of the Woods, and the Nummularia, Moneywort, or Herb Twopence, are both more common with us than the foregoing.

The purple-flowered Moneywort is one of thoſe plants, which is almoſt peculiar to England and France; hence we wonder that Linnæus has omitted it in his Flora Anglica.

CAMPANULA, Gen. Plant. N°. 201.

Campanula foliis ſtrictis: radicalibus lanceolato-ovalibus, panicula patula. Sp. Plant. 163. 4. Campanula eſculentæ facie ramis et floribus patulis Dill. Elth. 68. Tab. 58. *The rigid leaved Bell-flowers, with a diffuſive panicle and patulous flowers.*

This plant is found pretty plentifully in Buddon Wood near Loughborough, and eſpecially in ſome of the hedges and lanes adjoining. It flowers in July and Auguſt.

Dr. Dillenius found this plant near Worceſter, and took it for a Non-deſcript, though poſſibly it may be the plant, hinted at by *Merret* in his *Pinax*, under the appellation of *Rapuntium flore purpureo*. It has ſince been found in Sweden, though Linnæus makes no mention of it in any of his works before the Species Plantarum: elſewhere we have no intelligence of it. We have no doubt but ours is the plant deſcribed by both theſe authors; but if I might be allowed the conjecture, I ſhould think it was known to Parkinſon, and is the plant, which he deſcribes and figures under the title of Rapunculus nemoroſus. Theat. Bot. p. 649. 650. He tells us that the plant he deſcribes under that name grows naturally wild in England; and tho' his figure is very aukward, and his deſcription very vague, yet both anſwer better to our plant than to any other of the Bell-flowers, which grow ſpontaneouſly in England. Parkinſon took his plant to be the Rapunculus nemoroſus of Tabernæmontanus and the Rapunculus campanulatus neriifolius tertius of Thalius, or the nemoroſus anguſtifolius magno flore major of C. Bauhine pin. 93. N°. 11. But M. Vaillant, (Bot. Pariſ. p. 27.) and Dr. Haller (Enum. Stirp. Helv. p. 494.) apply all theſe names to the Peach-leaved Bell-flower: hence if theſe two able botaniſts are right, Parkinſon muſt have been miſtaken, as the Peach-leaved Campanula, which he deſcribes and figures likewiſe in the ſame chapter, is not a native of England.

Whence comes it that profeſſor Linnæus in the Flora Anglica has referred his trivial name of the plant

plant in queſtion to the Rapunculus eſculentus or Common Rampions of Ray's Syn. p. 277. N°. 4. and that he has in the ſame piece omitted this laſt plant, although he mentions it in the Species Plantarum, p. 164. as a native of this iſland?

Campanula caule angulato ſimplici, floribus ſeſſilibus, capitulo terminali. Vir. cliff. 16. Sp. Pl. 166.
Campanula pratenſis flore conglomerato, C.B. pin. 94. Raii Syn. 277. *Little Throatwort or Canterbury Bells.*

In mountainous places, eſpecially in a chalky ſoil. It flowers in July. This plant is very ſcarce in this county; I have obſerved it about Grantham, Ancaſter, and Sleaford, in Lincolnſhire, very plentifully.

Campanula caule baſi ſubramoſo ſtricto, foliis oblongis crenatis, calycibus aggregatis corolla longioribus, capſulis priſmaticis, Sp. Pl. p. 168.
Campanula arvenſis erecta vel Speculum Veneris minus Ger. em. 439. Park. 1331. Raii Syn. p. 278. *The leſſer Venus Looking-glaſs, or codded Corn Violet.*

Among the corn flowering in June and July. This I obſerved pretty plentifully among the corn for four or five years ſucceſſively near Loughborough.

Dr. Haller takes this to be only a variety of the common Venus Looking-glaſs of the Gardens, and has put it down as ſuch in the Enum. Stirp. Helv. p. 496. and though Linnæus makes it diſtinct, he doubts whether it be not originally ſprung from the ſame plant.

SAMO-

SAMOLUS, Gen. Plant. 205.

Samolus, Hort. Cliff. 51. Fl. Suec. 165. Sp. Plant. 171.

Anagallis aquatica folio non crenato, C. B. pin. 252. *Round leaved Water Pimpernel.*

In marſhes flowering in June. This is very ſcarce in theſe parts: I have ſeen it in the outwoods, and in Buddon Wood, near Loughborough; alſo upon ſeveral bogs near Charley Foreſt.

ATROPA Gen. Plant. N°. 222.

Atropa caule herbaceo foliis ovatis integris. Sp. Plant. p. 181. Bella Donna Cluſ. Raii Syn. 264. *Dwale, or Deadly Nightſhade.*

It flowers in May. About Grace Dieu Abbey in this county, but ſparingly. About North Luffenham in Rutland.

The intoxicating and poiſonous quality of this herb is well known, and too many dreadful inſtances of its effects are to be found in various authors. See Matthiolus Comment. in Dioſcorid. p. 756. Edit. 1598. Gerard em. p. 341. Bodæus à ſtapel in Theophraſt. p. 586. Wepfer Hiſt. Cicut. aquat. cap. 17. Boerhaave Hiſt. Plant. Lugd. Bat. p. 510. The memorable ſtory of the intoxication of the Danes by the Scots, as it is related by Buchanan Rer. Scot. lib. 7. is quoted by almoſt all ſucceeding writers, when mentioning this plant. Later inſtances of its bad effects may be ſeen in the Gentleman's Magazine for Auguſt and September 1747; alſo in the Magazine for September 1748. See alſo the caſe of two children

and

and their father; the former of which died, and the latter narrowly escaped, by eating the berries of this plant. Hill's British Herbal, p. 329. Dr. Haller quotes several authors both antient and modern to prove its deleterious quality. Enum. Stirp. Helv. p. 507.

As pernicious, however, as this plant has generally proved, when taken unwarily, there are gentlemen in the medical way, who have dared to administer it internally in one of the most formidable diseases incident to human nature: this is nothing less than the cancer. In the year 1739, there was a thesis published at Hall in Saxony, tending to prove it a specific in the cancer. Since then it has been administered in a case of that kind with the greatest success. This case is related in a very circumstantial manner and with the greatest appearance of candor and ingenuity, in the Bithiotheque Des Sciences et des Beaux Arts, for the first three months of the 1755. One successful case is far from being sufficient to establish the credit of a new medicine; but the result of that case seems to render it worthy of a farther trial: and happy will it be for a miserable part of mankind, if it be hereafter attended with the same success.

RHAMNUS, Gen. Plant. N°. 235

Rhamnus inermis, floribus monogynis hermaphroditis, foliis integerrimis. Hort. Cliff. 70. Sp. Plant. 193.

Frangula seu alnus nigra baccifera Park. 240. Raii Syn. p. 465. *The Black-berry bearing Alder.*

In

In moiſt woods flowering in April and May. In the outwoods near Loughborough plentifully. In Buddon Wood.

The inner bark of this tree, eſpecially of the root, is a violent purge. Haller obſerves, that the charcoal of the wood of this tree is preferable to others for making of gunpowder. Enum. Stirp. Helv. 164. and it is uſed for that purpoſe in Sweden, Fl. Suec. p. 68. Amæn. Acad. V. I. p. 360. The berries of this tree will ſtrike a good green, as Buckthorn berries do, and the inner bark will give a yellow dye. ibid.

Digynia.

GENTIANA, Gen. Plant. N°. 285.

Gentiana corollis quinquefidis hypocrateri-formibus, fauce barbatis. Sp. Plant. p. 230.

Gentiana pratenſis flore lanuginoſo C. B. pin. 188. Raii Syn. 275. *Dwarf Autumnal Gentian, or Fellwort.*

In dry mountainous paſtures eſpecially where the ſoil is chalky. It flowers in Auguſt. In the paſtures about Eaſt Leke, Nottinghamſhire, but ſparingly.

The Vernal Dwarf Gentian, ſaid, in the Synopſis, p. 275, to be found by Mr. Fitz Roberts near Kendal, is a miſtake, ariſing from the autumnal Gentian being obſerved to flower ſooner than common: hence it does not appear, that that plant has yet been found in England. See Wilſon's Synopſis of Britiſh Plants, p. 135.

The Gentiana perfoliata Linnæi, or Yellow Centory, continues to grow where Dr. Deering mentions it near Nottingham.

Tordylium, Gen. Plant. N°. 293.

Tordylium umbella conferta nudiuſcula: foliis pinnatis: foliolis lanceolatis inciſo-ſerratis. Sp. Plant. 240.

Caucalis arvenſis echinata latifolia. C. B. p. 152. Raii Syn. p. 219. *Purple-flowered great Baſtard Parſley.*

I have never ſeen this plant in Leiceſterſhire, but have obſerved it among the corn in Lincolnſhire, eſpecially about Ancaſter and Sleaford.

Tordylium umbellis ſimplicibus ſeſſilibus, ſeminibus exterioribus hiſpidis, Sp. Plant. p. 240.

Caucalis nodoſa echinato ſemine, C. B. p. 153. Raii Syn. p. 223. *Knotted Parſley.*

On the borders of fields, by the way ſides, and on dry banks, flowering in June and July.

Upon the banks by the turnpike-road about Hathern. Mr. Tomlinſon. Upon dry banks about Leiceſter.

Peucedanum, Gen. Plant. N°. 302.

Peucedanum foliolis pinnatifidis: laciniis oppoſitis. Hort. Cliff. 94. Flor. Sibir. I. p. 189. Sp. Plant. p. 246.

Seſeli pratenſe noſtras. Park. Raii. Syn. p. 216. *Meadow Saxifrage.*

This plant is very plentifully found in moſt of our moiſt meadows and paſtures, and not unfrequent-

ly on the higher grounds. It flowers in May and June.

This plant is omitted by Linnæus in the Flora Anglica, although it is one of thoſe which is found as plentifully here as in any other part of Europe.

SIUM, Gen. Plant. 310.

Sium foliis pinnatis, umbella terminali. Hort. Cliff. 98. Sp. Plant. 251.

Sium majus latifolium in ſummitate umbelliferum, Raii Syn. p. 211.

Sium latifolium, C. B. pin. 154. *Great Water Parſnep.*

In and about the banks of rivers, flowering in July. In many places, in the river Soar, near Leiceſter, and Loughborough.

SISON, Gen. Plant. N°. 311.

Siſon foliis pinnatis, umbellis erectis. Royen. Lugd. 105. Sp. Plant. p. 252.

Sium aromaticum Siſon officinarum, Tourn. 308. Raii Syn. 211 *Baſtard Stone Parſley.*

In moiſt places about the banks of ditches, &c. flowering in July. In and about the N. E. ſide of Okely Wood, near Hathern. Mr. Tomlinſon.

PHELLANDRIUM, Gen. Plant. N°. 315.

Phellandrium foliorum ramificationibus divaricatis, Sp. Plant. 255.

Phellandrium vel Cicutaria aquatica, J. B. III. 183. Raii Syn. p. 215. *Water Hemlock.*

Abundantly in the river Soar about Leiceſter.

This

This plant has been in great repute in Germany, and particularly Heiſter has given great commendations of it. It is uſed externally for diſcuſſing tumours of the ſchirrous kind, and in cataplaſms for cancers and gangrenes. It has the character of being poiſonous; and it has been obſerved, that if horſes eat of it, it will occaſion a paraplegia: on the other hand, the cows are fond of it, and eat it without any ill conſequence. Amæn. Acad. Vol. I. p. 361. 418.

Cicuta, Gen. Plant. N°. 316.

Cicuta umbellis folio oppoſitis, petiolis marginatis obtuſis. Sp. Plant. 255.

Sium pinnis laciniatis, pinnulis trifidis, nervo non folioſo. Hall. Helv. p. 436.

Sium alterum oluſatri facie Lob. Icon. 208. Raii Syn. p. 212. *Long-leaved Water Hemlock.*

About the banks of rivers and ponds, and in marſhes, flowering in July and Auguſt.

This is not common with us: I have only obſerved it in the pool in Nottingham park, eſpecially at the upper end towards the rock-holes.

Many and dreadful are the inſtances, of the fatal effects of this plant; as not only Wepfer's treatiſe, but many other papers in the various periodical productions of Europe, evidently prove. Dr. Haller refers to ſeveral, Enum. Stirp. Helv. p. 436. See alſo the Philoſophical Tranſactions, N°. 480. When Linnæus was at Tornoa, upon the Lapland expedition, he diſcovered to the inhabitants, that the great deſtruction of their horned cattle, in the ſpring, when they were firſt turned out,

and when it was no uncommon thing for an hundred of them to periſh, was intirely owing to this plant, which is very common in their paſtures. Flor. Lappon. p. 72. The Flora Suecica confirms the ſame effects upon the horned cattle. p. 84. Dr. Gmelin, who obſerved it in the marſhes almoſt all over Ruſſia and Sibiria, tells us, that the people there univerſally affirm, that the horſes eat it without any ſubſequent ill conſequence; but that it infallibly kills the horned cattle, and that they ſwell very much before they die; which ſymptom Linnæus had remarked in thoſe that periſhed at Tornoa. The inhabitants ſay likewiſe, that the root of the plant is abundantly more poiſonous than the leaves. See Flora Sibirica, Vol. I. p. 203.

PIMPINELLA, Gen. Plantar. N°. 328.

Pimpinella ſaxifraga major umbella candida, C. B. pin. 159.

Pimpinella ſaxifraga Ger. em. 1044. Raii Syn. p. 213.

Tragoſelinum pinnis ſemilobatis, circumferratis. Hall. Helv. 428. *Great Burnet Saxifrage.*

In woods, and among buſhes in ſhady places, flowering in July. In Hallinghall Wood near Loughborough. In Stocking Wood, and the hedges adjoining, near Leiceſter.

The Pimpinella ſaxifraga minor is very common with us in dry paſtures, and upon banks, about hedges.

Linnæus, Royen, and Ludwig, join theſe two ſpecies together, on ſuppoſition that they do not

differ

differ eſſentially. Haller keeps them ſeparate, as not having ſeen the effect of culture upon them. Great deference is due to the opinion of ſuch eminent botaniſts, and who have had ſuch great opportunities for obſervation: the difference however is very remarkable, and we have ſeen them in the fields keeping that difference, when growing together upon the ſame ſoil.

The root of this plant is one of the ingredients in the Pulvis Ari compoſitus of the ſhops, and is a ſimple much eſteemed by ſome of the German phyſicians, particularly by the followers of Stahl. Very few of our herb-gatherers know this plant, but produce the root of the common Sanguiſorba or Burnet, or thoſe of meadow Saxifrage, for it.

Tetragynia.

PARNASSIA, Gen. Plant. N°. 345.

Parnaſſia Fl. Lap. N°. 108. Fl. Suec. 252. Hall. Helv. 316. Sp. Plant. 273.

Parnaſſia vulgaris et paluſtris Tourn. Raii Syn. 355. *Graſs of Parnaſſus.*

On bogs and marſhes, flowering in Auguſt. In ſeveral of the marſhy cloſes near Buddon Wood.

Pentagynia.

STATICE, Gen. Plant. N°. 348.

Statice caule nudo ſimplici capitato. Hort. Cliff. 115. Sp. Plant. 272.

Statice montana minor. Tourn. 341. Raii Syn. p. 203. *Thrift, or Sea Gilly-flower.*

It

It flowers in June and July. This is not only found in the marſhes near the ſea, but farther in the inland parts of the country, as I obſerved in Lincolnſhire, where it is very plentiful about Grantham and Sleaford. I have not ſeen it nearer Leiceſter than upon a heath not far from Belvoir Caſtle.

HEXANDRIA.

monogynia.

Narcissus, Gen. Plant. N°. 364.

Narciſſus ſpatha uniflora: nectarii limbo campanulato erecto, petalo æquali. Sp. Plant. p. 289.

Narciſſus ſylveſtris pallidus calyce luteo, C. B. pin. 52. R. Syn. 371. *Wild Engliſh Daffodil.*

It flowers in March, but is very rare hereabout: I have ſeen it by the brook-ſide, between the obeliſk and the hall, in Garenton Park.

Allium, Gen. Plant. N°. 370.

Allium ſcapo nudo ſemicylindrico, foliis lanceolatis petiolatis, umbella faſtigiata. Sp. Plant. 300.

Allium foliis radicalibus petiolatis, floribus umbellatis. Roy. Lugd. 39. Hall. Helv. p. 297. Hall. All N°. 21. Opuſcul. Bot. p. 379.

Allium ſylveſtre latifolium, C. B. p. 74. Raii Syn. 370. *Ramſons.*

This is not common in Leiceſterſhire. I have ſeen it among ſome buſhes by the ſide of a rivulet near Buddon Wood. The Allium vineale Linnæi, or common Crow Garlick, is likewiſe but rarely ſeen hereabout.

CONVALLARIA, Gen. Plant. N°. 383.

Convallaria ſcapo nudo, Flor. Lap. 113. Flor. Sibir. P. I. p. 34. Sp. Plant. p. 314.

Lilium convallium, Ger. 331. Raii Syn. p. 264. *Lily of the Valley. Lily Convally, or May Lily.*

In ſhady woods flowering in May. In Okely and Buddon Woods near Leiceſter.

Dr. Haller obſerves, that a beautiful and durable green colour may be prepared from the leaves of this plant with Lime. Enum. Stirp. Helv. p. 287.

ACORUS, Gen. Plant. N°. 107.

Acorus, Roy. Lugd. 6. Hall. Helv. p. 259. Fl. Sibir. I. p. 1. Fl. Suec. 277. Sp. Pl. p. 324.

Acorus verus ſive Calamus Officinarum, Park. 140. Raii Syn. 437. *True Acorus, or Sweet-ſmelling Flag.*

It is found in the river Soar, in ſeveral places between Kegworth and Loughborough; eſpecially about Normanton plentifully; alſo near the abbey at Leiceſter, but very ſparingly. It puts forth its catkin in May.

Trigynia.

RUMEX, Gen. Plant. N°. 407.

Rumex floribus hermaphroditis: valvulis integerrimis: unica granifera, foliis cordato lanceolatis. Hort. Cliff. 138. Sp. Pl. 335.

Lapathum folio acuto rubente, C. B. p. 115. Raii Syn. 142. Pet. Herb. Britan. Tab. 2. Fig. 5. *Bloodwort, or Bloody Dock.*

In

In kitchin gardens, fallow lands, dunghills, &c. not very uncommon, flowering in July and Auguſt.

RUMEX, qui Lapathum folio acuto flore aureo, C. B. p. 115. Raii Syn. p. 142. Anthoxanthon, J. B. II. 988. Pet. Herb. Britan. Tab. ii. Fig. 8. *Golden Dock.*

In moiſt paſtures and about ditches. In a paſture by the river-ſide near Hathern; Mr. Tomlinſon. Alſo about Loughborough in ſeveral places.

TRIGLOCHIN, Gen. Pl. N°. 409.

Triglochin capſulis trilocularibus ſublinearibus, Fl. Suec. 298. Sp. Plant. 338. Juncajo paluſtris et vulgaris. Tourn. Raii Syn. p. 435. Michel. p. 43. *Arrow-headed Graſs.*

Here and there by brook ſides, and in marſhy places; about Woodhouſe, and elſewhere, but ſparingly.

This graſs is plentiful in Sweden, Ruſſia, and Sibiria, and the oxen are extremely fond of it. From the Pan Suecus it appears, that the goats, ſheep, horſes, and ſwine, will likewiſe all eat it.

OCTANDRIA.

monogynia.

VACCINIUM, Gen. Plant. N°. 434.

Vaccinium pedunculis unifloris, foliis ſerratis ovatis deciduis, caule angulato. Fl. Lappon. 143. Hall. Helv. 415. Fl. Suec. 313. Sp. Plant. p. 349.

Vitis

Vitis Idæa anguloſa, J. B. I. 520. Raii Syn. 457. *Whorts, or Whortle-Berries; Leiceſtrienſibus Bill-Berries.*

On heaths, and in woods flowering in April. In the outwoods near Loughborough, and in Buddon Wood near Mountſorrel plentifully.

Bill-berries furniſh the Laplanders with ſome of the greateſt dainties of their table. See Fl. Lap. p. 108. Theſe berries are very aſtringent. Haller refers to the Acta Breſl. Ann. 1722, for an inſtance where a decoction of them brought on ſuch a conſtipation of the bowels as proved mortal. Enum. Stirp. Helv. p. 415.

ERICA, Gen. Plant. N°. 435.

Erica antheris bicornibus incluſis, corollis ovatis racemoſis, foliis ternis glabris linearibus. Sp. Plant. p. 352.

Erica tenuifolia, Ger. 1198. Raii Syn. p. 471. *Fine-leaved Heath.*

This I have obſerved upon Charley Foreſt, among the common heath; but more plentifully upon the wolds between Aſhby De la Zouch and Burton upon Trent.

Erica antheris bicornibus incluſis, corollis ſubgloboſis aggregatis calyce longioribus, foliis quaternis ciliatis patentibus. Sp. Plant. 353.

Erica brabantica folio Coridis hirſuto quaterno. J. B. I. 358. R. Syn. 471. *Low Dutch Heath, or Beſom Heath.*

With the former, and more plentiful.

Dr. Plot tells us, that heath or ling is uſed in ſome parts of Staffordſhire to malt liquor inſtead

of hops, and that it preſerves it as long, without any diſagreeable taſte. It is a very grateful plant to the bees; and it is well known, that they procure great quantities of honey from it; but what they gather from this plant generally gives the maſs a reddiſh colour, and is not reckoned the beſt honey.

Daphne, Gen. Plant. N°. 436.

Daphne racemis axillaribus, foliis lanceolatis glabris. Sp. Plant. 357.

Thymelæa floribus inter folia acuminata, levia duraque. Hall. Helv. 188.

Laureola, Ger. 1219. R. Syn. p. 465. *Spurge Laurel.*

In hedges, among buſhes, and in woods flowering in March. In ſome hedges about Belton, near Loughborough. In the lanes about Enderby near Leiceſter: but is not common with us.

Trigynia.

Polygonum, Gen. Plant. N°. 445.

Polygonum caule ſimpliciſſimo monoſtachyo, foliis ovatis in petiolum decurrentibus. Mat. Med. 189. Sp. Plant. p. 360.

Biſtorta major Ger. 322. R. Syn. p. 147. *The greater Biſtort or Snakeweed.*

In moiſt meadows flowering in May. In ſome of the paſtures and moiſt cloſes near Leiceſter.

Tetragynia.

PARIS, Gen. Plant. N°. 449.

Paris. Sp. Plant. p. 367.

Paris foliis quaternis. Flor. Lap. 155. Fl. Suec. 325. Hall. Helv. 412.

Herba Paris. Ger. 328. Park. 390. Raii Syn. p. 264.

Herb Paris, True Love, or One Berry.

In woods flowering in May. In Okely Wood near Hathern. Mr. Tomlinſon. In Hollinghall Wood near Loughborough more plentifully. In the Stocking Wood near Leiceſter ſparingly.

ADOXA, Gen. Plant. N°. 450.

Adoxa, Hort. Cliff. 152. Fl. Suec. 326. Raii Syn. 267.

Moſchatellina foliis Fumariæ bulboſæ, J. B. 3. 206. Raii Syn. 267.

Tuberous Moſchatell, or Muſk-wood Crowfoot.

Among the buſhes on the ſouth-ſide of Buddon Wood, but ſparingly. It flowers in April.

DECANDRIA

digynia.

CHRYSOSPLENIUM, Gen. Plant. N°. 493.

Chryſoſplenium foliis oppoſitis. Sauv. Monſp. 128. Sp. Plant. 398.

Saxifraga aurea Park. 425. R. Syn. p. 158.

Golden Saxifrage.

In moiſt undiſturbed places, about hedges, ditches, and in woods flowering in April and May.

In the outwoods near Loughborough. Alſo in the ſame place with the foregoing plant.

Pentagynia.

Cotyledon, Gen. Plant. N°. 512.

Cotyledon foliis cucullatis ſerrato-dentatis alternis, caule ramoſo, floribus erectis. Sp. Plant. p. 429.
Cotyledon vera radice tuberoſa, J. B. 3. 683. R. Syn. p. 271.
Wall Penny-wort, Kidney-wort; Leiceſtrienſibus Navel-wort.

Upon rocks and old walls flowering in May. Plentifully upon the rocks about the ſlate-pits at Swithland.

Cerastium, Gen. Pl. 518.

Ceraſtium foliis lineari-lanceolatis obtuſis glabris, corollis calyce majoribus. Flor. Suec. 381. Sp. Plant. p. 438.
Myoſotis arvenſis hirſutus flore majore Tourn. Vaill. Bot. Par. T. 30. F. 4.
Caryophillus arvenſis hirſutus flore majore, C. B. p. 210. R. Syn. 348.
Long-leaved rough Chickweed with a large flower.

On heaths and dry paſtures in a ſandy ſoil. I have never ſeen a ſingle plant of this ſpecies near Leiceſter, but have obſerved it abundantly plentiful upon the heaths in Lincolnſhire.

The Ceraſtium viſcoſum Linnæi, the ſemidecandrum, and aquaticum, are all three very common with us.

Sper-

SPERGULA, Gen. Plant. N°. 519.

Spergula foliis oppoſitis ſubulatis lævibus, caulibus ſimplicibus. Sp. Plant. 440.

Alſine paluſtris foliis tenuiſſimis, ſeu ſaxifraga paluſtris anglica. Ger. em. p. 567, 568. Raii Syn. p. 350.

Engliſh Marſh Saxifrage.

On the bogs in Charley Foreſt near Beacon-hill, ſparingly.

DODECANDRIA
trigynia.

RESEDA, Gen. Plant. N°. 535.

Reſeda foliis omnibus trifidis; inferioribus pinnatis. Hort. Cliff. p. 213. Hall. Helv. p. 315. Dalib. Par. 159. Sp. Plant. 449.

Reſeda vulgaris, C. B. p. 100. R. Syn. p. 366.

Baſe Rocket.

About the borders of fields; and upon fallow land, in a ſandy and chalky ſoil. This is ſcarce with us: I have not ſeen it in any part of Leiceſterſhire where I have been, except about Waltham on the Wolds. It is plentiful about Ancaſter in Lincolnſhire.

ICOSANDRIA
polygynia.

ROSA, Gen. Plant. N°. 556.

Roſa caule petioliſque aculeatis, calycis foliolis indiviſis, Fl. Suec. 407. Sp. Plant. p. 491.

Roſa

Roſa pumila ſpinoſiſſima foliis Pimpinellæ glabris flore albo. J. B. 2. 40. R. Syn. p. 445.

The Burnet Roſe.

On ſandy ground flowering in June and July. Among the Gorſe about E. and W. Leke, Nottinghamſhire. About Kegworth and Sawley, and elſewhere.

RUBUS, Gen. Plant. N°. 557.

Rubus foliis quinato-pinnatis ternatiſque, caule aculeato, petiolis canaliculatis. Flor. Suec. 408. Sp. Plant. p. 493.

Rubus Idæus ſpinoſus fructu rubro. J. B. 2. 59. R. Syn. 467.

Framboiſe, Hindberry; Leiceſtrienſibus Raſpberry.

In mountainous and ſtony places; it flowers in May. In Buddon Wood near Mountſorrel.

The Rubus cæſius is not uncommon with us.

FRAGARIA, Gen. Plant. N°. 558.

Fragaria caule decumbente repente. Roy. Lugd. 274. Dal. Par. 147. Sp. Plant. 495.

Fragaria ſterilis. C. B. p. 327. Raii Syn. p. 254.

Barren Strawberry.

In dry barren paſtures, and mountainous woods. This is very common with us; much more ſo than the Fragaria veſca Linnæi, or Common Strawberry, which is found in our woods but ſparingly.

POTENTILLA, Gen. Plant. N°. 559.

Potentilla foliis quinatis cuneiformibus inciſis ſubtus tomentoſis, caule erecto. Sp. Plant. p. 497.

Penta-

Pentaphyllum erectum foliis profunde ſectis ſubtus argenteis flore luteo. J. B. 2. 398. R. Syn. p. 255.

Tormentil Cinquefoil.

On dry mountainous paſtures, eſpecially in a ſandy ſoil, flowering in July. Upon the old walls about Buddon Wood near Mountſorrel. Upon Cotgrave and Stanton wolds, Nottinghamſhire.

TORMENTILLA, Gen. Plant. N°. 560.

Tormentilla caule repente, Sp. Plant. p. 500.

Tormentilla reptans. Petiv. Herb. Britan. Tab. XLI. Fig. 10. R. Syn. p. 257.

Creeping Tormentil with deeply indented leaves.

In the Radmoor cloſes, between Loughborough and Burley-hall.

The common Tormentil is ſo very frequently found in a *procumbent* ſtate, that perſons not much acquainted with plants, might eaſily miſtake it for this ſpecies, without ſome other diſtinctive note: hence we wonder, that Linnæus did not form his ſpecific names of theſe two plants rather from their cauline leaves, than from their manner of growing; thoſe of the common Tormentil being generally quite ſeſſile, or cloſe to the ſtalk; whereas thoſe of this ſpecies are conſtantly petiolated. The former might then have been called—Tormentilla foliis caulinis ſeſſilibus, and the latter—Tormentilla foliis caulinis petiolatis. The diſtinction from their manner of growing might have been added too; but it would be almoſt needleſs, and therefore contrary to our illuſtrious author's own rule in the Fundamenta Botanica, N°. 291.

POLY-

POLYANDRIA

pentagynia.

AQUILEGIA, Gen. Plant. N°. 605.

Aquilegia nectariis incurvis, Hort. Upſ. 150. Sp. Plant. p. 533.

Aquilegia flore ſimplici, J. B. III. 384. R. Syn. p. 273.

Columbines.

In woods flowering in May and June. In the outwoods near Loughborough.

DIDYNAMIA

gymnoſpermia.

TEUCRIUM, Gen. Plant. N°. 625.

Teucrium foliis cordatis ſerratis petiolatis, racemis lateralibus ſecundis, caule erecto. Sp. Plant. p. 564.

Scordium alterum ſeu Salvia agreſtis Ger. 536. R. Syn. p. 245.

Wood Sage.

In all our neighbouring woods, and among the rocks all over Charley Foreſt. This is ſold by many of our herb-gatherers for the true Scordium, to which indeed it is reckoned no bad Succedaneum.

NEPETA, Gen. Plant. N°. 629.

Nepeta floribus ſpicatis, verticillis ſubpedicellatis, foliis petiolatis cordatis dentato-ſerratis. Sp. Plant. p. 570.

Nepeta

Nepeta major vulgaris, Park. 38. R. Syn. p. 237.
Nep, or Cat-mint.

On dry banks about hedges, &c. flowering in June and July. In Preſtwold lanes near Loughborough. In Grooby-lane near Leiceſter. I obſerved about Grantham in Lincolnſhire.

MENTHA, Gen. Plant. N°. 633.

Mentha floribus ſpicatis folio oblongis ſerratis. Hort. Upſ. 168. Sp. Plant. p. 576. β
Menthaſtrum ſpicatum foliis longiore candicante, J. B. Syn. 234.
Long leaved Horſe-mint.

It flowers in July. I have obſerved this about Swithland: alſo at Thorp near Loughborough, and elſewhere, but not very common.

Mentha verticillata minor acuta non criſpa odore Ocymi, J. B. III. 2. 216. Raii Syn. p. 232. N°. 5.
Red Mint.
An. Mentha floribus verticillatis, foliis ovatis acutis ſerratis, ſtaminibus corolla brevioribus. Sp. Plant. p. 577.

This is very ſcarce with us: I have only ſeen it growing in the outwoods near Loughborough, and there but ſparingly.

De ſpecie nullum certe dico, cum genere Linnæana interim omnino convenit noſtra Planta. Caulis erectus, ſimplex, vix pedalis: Folia longe elliptica in petiolis fere deſinentibus, ſerrata, glabra: Flores in verticillis laxis e radice ad ſummitatem conferti: ſtamina corolla longiora: unde dubium, annon Mentha *gentilis* Linnæi?

THYMUS, Gen. Plant. N°. 646.

Thymus floribus verticillatis, pedunculis unifloris, caulibus erectis, ſubramoſis, foliis acutis ſerratis. Flor. Suec. 478. Sp. Plant. p. 591.
Acinos multis. J. B. III. 2. 259. Raii Syn. p. 238.
Wild Baſil.

It flowers in June. This is very ſcarce about Leiceſter. I gathered it not far from Belvoir Caſtle, and about Waltham on the wolds. The Clinopodium Origano ſimile. C. B. is frequent with us.

MELISSA, Gen. Plant. N°. 647.

Meliſſa pedunculis axillaribus dichotomis folio longioribus, caule decumbente. Sp. Plant. p. 593.
Calamintha odore pulegii, Ger. em. 687. Raii Syn. p. 243.
Field Calamint.

On the borders of the fields, about the public roads, and on the banks of hedges flowering in July and Auguſt. In Preſtwold lanes near Loughborough. In the Town-ſtreet near Swithland, and elſewhere.

angioſpermia.

OROBANCHE, Gen. Pl. N°. 697.

Orobanche caule ſimpliciſſimo pubeſcente ſtaminibus incluſis. Sp. Plant. 632.
Orobanche major Caryophyllum olens. C. B. p. 87. R. Syn. p. 288.
Broom Rape.

It flowers in June, among the gorſe and broom about the outwoods near Loughborough; alſo about Thrinkſton, Grace Dieu, and Sheepſhead.

TETRADYNAMIA.

Siculoſa.

IBERIS, Gen. Plant. N°. 721.

Iberis foliis ſinuatis, caule nudo ſimplici. Hort. Cliff. 328. Sp. Plant. 650.

Naſturtium petræum Tabernæm. Icon. 451. Ger. 194. R. Syn. p. 303.

The leſſer Shepherd's Purſe or Rock-Creſs.

On dry ſandy mountainous ground among rocks and ſtones, flowering in May. Upon the rocks at the ſummit of Beacon-hill, in Charley Foreſt; alſo about the ſlate-pits at Swithland.

Siliquoſa.

CARDAMINE, Gen. Plant. N°. 727.

Cardamine foliis pinnatis, floribus apetalis. Sp. Plant. p. 665.

Cardamine foliis pinnatis pinnis laciniatis. Hort. Cliff. 336. Hall. Helv. p. 557.

Cardamine impatiens vulgo Sium minus impatiens, Ger. em. 260. R. Syn. p. 299.

Impatient Ladies-ſmock or Cuckow Flower.

It flowers in April and May. Among the rocks upon the ſummit of Beacon-hill; elſewhere I have not found it.

Cardamine foliis pinnatis, floribus tetandris. Hort. Cliff. 336. Sp. Pl. 655.

Cardamine impatiens altera hirſutior, R. Syn. p. 300.

The leſſer hairy impatient Cuckow Flower.

By the ſide of the brook at Thorp near Loughborough; and elſewhere, but ſparingly.

MONADELPHIA decandria.

GERANIUM, Gen. Plant. N°. 746.

Geranium pedunculis bifloris, calycibus pyramidatis angulatis rugoſis, foliis quinquelobis rotundatis. Fl. Suec. 575. Sp. Plant. 682.

Geranium ſaxatile, Ger. em. 938. Park. 707. R. Syn. p. 360.

Shining or Stone Doves-foot Craneſbill.

This is not common with us; I have obſerved it among the rocks upon Charley Foreſt, particularly about Baſdon Hill.

Geranium pedunculis bifloris foliiſque, ramis alternis caule ramoſo, diffuſo, calycibus muticis. Sp. Plant. p. 682.

Geranium columbinum majus, diſſectis foliis. Ger. em. 938. R. Syn. 359.

Doves-foot Cranes-bill with jagged leaves.

Vaillant's figure, Tab. 15. Fig. 3. exactly repreſents our plant.

Geranium foliis ad nervum quinquefidis, pediculis brevioribus, caule erecto. Hall. Helv. p. 366. Dalib. Paris. p. 207. N°. 5.

Haller's Deſcription, and Vaillant's Figure, Tab. 15. Fig. 2. preciſely agree with our plant, ſo

ſo does Linnæus's ſpecific name, Sp. Plant. 682. N°. 35. But as he there refers to Vaillant's fourth Figure, we cannot adopt his Synonym, thoſe figures being greatly different from each other.

Geranium pedunculis biflоris, petalis integris longitudine calycis, caule proſtrato, foliis reniformibus inciſis. Sp. Pl. p. 683.

Geranium folio malvæ rotundo, C. B. p. 318.

Doves-foot, or Doves-foot Cranes-bill.

Theſe three laſt are all pretty frequent with us: the two former, however, are by far the moſt plentiful. The Geranium pratenſe Lin. or batrachoides, J. B. is alſo not uncommon.

DIADELPHIA

hexandria.

FUMARIA, Gen. Plant. N°. 760.

Fumaria ſiliquis linearibus foliis cirrhiferis. Sp. Plant. 701.

Fumaria alba latifolia, Park. 288. Raii Syn. p. 335.

Climbing Fumitory.

In ſtony places, and among rocks in a ſandy ſoil, and ſometimes about ſtanding waters, flowering in May.

Upon the rocks in Charley Foreſt near Whitwick.

Decandria.

ANTHYLLIS, Gen. Plant. N°. 773.

Anthyllis herbacea foliis pinnatis inæqualibus, capitulo duplicato. Sp. Pl. 719.

Vulne-

Vulneraria foliis ad terram ſimplicibus ovatis, ad caulem pinnatis. Hall. Helv. 570.

Vulneraria ruſtica, J. B. II. 362. R. Syn. p. 325.

Kidney Vetch, or Ladies Finger.

On dry mountainous paſtures, eſpecially in a chalky ſoil, flowering in May and June. Plentifully about Ruddington Hills near Nottingham, and elſewhere.

This plant is ſubject to great variation in the colour of its flower; it is found in different places with white, yellow, red, and ſcarlet-coloured flowers: Linnæus thinks this variation depends in a great meaſure upon the difference of the ſoil; as he obſerved, that in ſome places, where the ſoil was a reddiſh clay, there the flowers were red. On the other hand, where the ſoil was a white clay, there he found the flowers white. See Fl. Suec. p. 215.

LATHYRUS, Gen. Plant. N°. 781.

Lathyrus pedunculis multifloris, cirrhis diphyllis, foliolis enſiformibus, Hort. Cliff. 367. Sp. Plant. 733.

Lathyrus ſylveſtris major. C. B. pin. 344. Raii Syn. p. 319.

The other great wild Lathyrus, or everlaſting Peaſe.

In Stocking Wood, and in a lane, leading from Belgrave to Thurcaſton, near the wood-ſide.

Lathyrus pedunculis multifloris, cirrhis polyphyllis, ſtipulis lanceolatis. Hort. Cliff. 368. Sp. Plant. 733.

Vicia

Vicia Lathyroides ſeu Lathyrus Viciæformis, Raii Syn. p. 320. Pluk. Phyt. Tab. 71. F. 2.
Chichling Vetch.

In boggy, watery places. Upon ſome of the bogs in Charley Foreſt about Bardon Hill.

HEDYSARUM, Gen. Plant. N°. 793.

Hedyſarum foliis pinnatis, leguminibus monoſpermis aculeatis, corollarum alis brevioribus. Sp. Plant. 751.

Onobrychis ſeu Caput Gallinaceum, Ger. 1063. Raii Syn. p. 327.
Medick Vetchling or Cocks-head.

This is not found with us. I have obſerved it in the cloſes in riding between Croxton and Grantham, Lincolnſhire. It flowers in May and June.

TRIFOLIUM, Gen. Plant. N°. 802.

Trifolium capitulis villoſis quinquefloris, involucro centrali reflexo rigido, fructum involvente. Hort. Cliff. 374. Sp. Plant. 767.

Trifolium pumilum ſupinum floſculis longis albis. Phyt. Br. R. Syn. 327. Tab. 13. Fig. 2.

Trifolium pratenſe ſupinum cathobleps ſeu capite humi merſo, Barr. Ic. 881.
Dwarf Trefoil with long white flowers.

Very common on dry ſandy banks flowering in May.

Trifolium capitulis ſeſſilibus ovatis, calycibus villoſis inæqualibus. Sp. Plant. 770.

Trifolium floſculis albis, in glomerulis oblongis aſperis cauliculis proxime adnatis. Raii Syn. 329. Vaill. Bot. Paris. Tab. 33. Fig. 1.

Knotted

Knotted Trefoil with oblong heads.

On ſeveral dry banks in St. Mary's Field, Leiceſter.

Trifolium capitulis ſeſſilibus globoſis, calycibus ſtriatis patulis æqualibus. Sp. Plant. p. 770.
Trifolium cum glomerulis ad caulinum nodos rotundis. R. Syn. p. 329.
Trifolium arvenſe ſupinum verticillatum. Bar. Ic. 882.

Knotted Trefoil with round heads.

In the cloſes oppoſite Needleſs Inn, near Loughborough.

Trifolium capitulis ſeſſilibus ſublateralibus ovatis, calycibus ſtriatis rotundatis. Sp. Plant. 770. An?
Trifolium parvum hirſutum, floribus parvis dilute purpureis, in glomerulis mollioribus et oblongis, ſemine magno. R. Syn. p. 329. Tab. 13. Fig. 3. optime.

Plentifully upon ſome lays near the fiſh-pool cloſe at Loughborough.

Trifolium ſpicis villoſis ovalibus, dentibus calycinis ſetaceis æqualibus. Hort. Cliff. 375. Sp. Plant. 769.
α Varietas minor ex Sententia Linnæi, quæ
Lagopus perpuſillus ſupinus perelegans maritimus Lobelii, Phyt. Br. Raii Syn. p. 336. Tab. 14. Fig. 2.

The leaſt Haresfoot, or Haresfoot-Trefoil.

Upon the banks of the Raw-Dikes, in St. Mary's Fields, Leiceſter.

POLYA-

POLYADELPHIA
polyandria.

Hypericum, Gen. Plant. Nº. 808.

Hypericum floribus trigynis, caulibus ancipitibus proſtratis. Sp. Plant. 785.
Hypericum minus ſupinum, Park. 572. R. Syn. P. 343.
The leaſt trailing St. John's-wort.
On heaths and barren ſandy ground flowering in July. Upon Charley Foreſt. About Buddon Wood, and elſewhere.

Hypericum floribus trigynis; calycibus ſerrato-glandulosis, foliis cordatis glabris. Sp. Plant. 786.
Hypericum pulchrum Tragi, J. B. III. 383.
Small upright St. John's-wort.
In almoſt all our neighbouring woods, flowering in July.

SYNGENESIA
Polygamia æqualis.

Lactuca, Gen. Plant. Nº. 814.

Lactuca foliis haſtato-linearibus ſeſſilibus, carina aculeatis. Sp. Plant. p. 796.
Chondrilla viſcoſa humilis, C. B. p. 130. Park. 783.
Lactuca ſylveſtris minima. Cat. Cant. p. 83. R. Syn. p. 162. Pet. Herb. Brit. T. 15. F. 4.
The leaſt wild Lettuce, or Dwarf Gum-Succory.
In Hollinghall and Buddon Woods, near Loughborough. In ſome hollow ways and ſhady lanes

about Sheepſhead and Thrinkſton. I obſerved it alſo in a hollow way at Carleton two miles from Nottingham.

HIERACIUM, Gen. Plant. N°. 818.

Hieracium foliis linearibus ſubdentatis ſparſis, floribus ſubumbellatis. Fl. Lap. 287. Flor. Sibir. II. p. 25. Sp. Plantar. p. 804.

Hieracium caule alto multifolio et multifloro, foliis firmis anguſtis plerumque dentatis, Hall. Helv. p. 748.

Hieracium fruticoſum anguſtifolium majus. C. B. p. 129. Park. 801. Raii Syn. 168. Petiv. Herb. Britan. Tab. 13. Fig. 8. 10.

Narrow-leaved Buſhy Hawkweed.

In almoſt all our woods, and among the rocks in Charley Foreſt, flowering in June and July.

This plant is ſubject to great variation, and ſeems to us to have been divided by many authors into ſeveral ſpecies. We have obſerved, that in the woods it grows more branched, having many more leaves, which are alſo broader, of a darker colour, and the flowers of a paler yellow, than when the plant is found upon open places. We are well aſſured that this is the plant mentioned by Dr. Deering in the Catalogus Nottinghamenſis, for the narrow-leaved golden Lungwort, having ſeen it in the places referred to by him; nor have we ſeen any plant hereabouts which anſwers to the deſcriptions and ſynonymes of the Pulmonaria gallica or murorum of Linnæus.

CAR-

CARDUUS, Gen. Plant. N°. 832.

Carduus foliis ſeſſilibus bifariam pinnatifidis, laciniis alternis erectis, calycibus globoſis villoſis. Hort. Upſ. 249. Sp. Plant. p. 823.

Carduus tomentoſus Corona fratrum dictus. R. Syn. p. 195.

Carduus capite rotundo tomentoſo. C. B. p. 382.

Woolly-headed Thiſtle.

This elegant plant is common with us, on mountainous ground flowering in July and Auguſt. About the Stocking Wood near Leiceſter. Upon the wolds about Dalby and Waltham. Upon Cotgrave Wolds, Nottinghamſhire. I have obſerved it likewiſe in many places about Kettering and Rowel in Northamptonſhire.

Carduus caule ſubunifloro, calyce inermi acuto, foliis amplexicaulibus lanceolatis ciliatis integris laciniatiſque. Hort. Cliff. 392. Sp. Plant. 824.

Cirſium Anglicum, Ger. em. 1183. R. Syn. p. 193.

The Engliſh ſoft or gentle Thiſtle.

This flowers in June, and is very rare in theſe parts: I have ſeen it in ſome of the boggy places at Woodhouſe near Buddon Wood.

Polygamia ſuperflua.

TUSSILAGO, Gen. Plant. N°. 856.

Tuſſilago thyrſo oblongo, floſculis fæmineis nudis plurimis. Hort. Cliff. 411. Sp. Plant. p. 866.

Petaſites major, floribus pediculis longis inſidentibus. R. Syn. 179.

Butter-Burr, with Flowers ſtanding on long Footſtalks.

It flowers in March, and is nearly as frequent with us as the common Butter-Burr. By Dixley Mill, near Loughborough, plentifully, which is the place referred to in Blackſtone's Specimen Botanicum, p. 71. By the ſide of a brook, in the road between Aſhby de la Zouch and Appleby. About Barkby, near Leiceſter, &c.

Solidago, Gen. Plant. N°. 859.

Solidago caule ſubflexuoſo angulato, racemis paniculatis erectis confertis. Sp. Plant. p. 880.

Solidago caule erecto, racemis alternis erectis. Hort. Cliff. 409. Hall. Helv. 729. Flor. Sibir. II. p. 164.

Virga aurea, Ger. 348. R. Syn. p. 176.

Golden Rod.

It flowers in July and Auguſt, and is found in mountainous woody places. It is plentiful about Buddon Wood near Mountſorrel.

Inula, Gen. Plant. N°. 860.

Inula foliis undulatis amplexicaulibus, caule proſtrato. Sp. Plant. p. 882.

Aſter caule ramoſiſſimo, foliis criſpis, floribus luteis ſæpe nudis. Hall. Helv. p. 727.

Conyza minor flore globoſo. C. B. p. 266.

Dwarf Fleabane.

I have obſerved this plant here-and-there about Loughborough; but it is very ſcarce in theſe parts: and Dr. Deering told me (1749) that he had not ſeen it about Nottingham; though I have been informed by Mr. Watſon, that it is very frequent about London.

Syn-

Syngeneſia monogamia.

Jasione, Gen. Plant. N°. 896.

Jaſione. Sp. Plant. p. 928.

Jaſione foliis lineari-lanceolatis obſolete ſerratis. Hort. Cliff. 426. Hall. Helv. 496. Fl. Suec. 713. Flor. Sibir. II. p. 215.

Rapunculus Scabioſæ capitulo cæruleo. C. B. pin. 22. Park. 646. R. Syn. 278.

Hairy Sheeps Scabious, or Rampions with Scabious Heads.

Plentifully all over Charley Foreſt, and about Buddon Wood. It flowers in June and July.

GYNANDRIA
diandria.

Orchis, Gen. Plant. N°. 900.

Orchis bulbis indiviſis, nectarii labio lanceolato integerrimo, cornu longiſſimo, petalis patentibus. Fl. Suec. 723. Mat. Med. 411. Sp. Plant. 939.

a. I. Varietas amplioribus foliis ex Hall. Helv. 266. v. Fl. Sibir. I. p. 16. II. quæ Orchis hermaphroditica bifolia, J. B. II. 772. Raii Syn. p. 380. 17.

Butterfly Satyrion.

In Hallinghall Wood near Loughborough; flowering in May.

b. II. Varietas ſtatura minore, ex iiſdem quæ Orchis alba bifolia minor calcari oblongo. C. B. p. 83. Raii Syn. 380. 18. Vaillant. Bot. Par. p. 151. Tab. 30. Fig 7.

The

The leſſer Butterfly Orchis.

Sparingly in ſome incloſures near Buddon Wood.

OPHRYS, Gen. Plant. N°. 902.

Ophrys bulbis aggregatis oblongis, caule ſubfolioſo, floribus ſecundis, Nectarii labio indiviſo. Act. Upſ. 1740. p. 32. Dalib. Par. 277. Sp. Plant. p. 944.

Orchiaſtrum, 1. 2. Michel. N. Pl. G. p. 30. Tab. 26.

Helleborine radicibus conicis ſimplicibus. Hall. Helv. p. 274.

Orchis ſpiralis alba odorata, J. B. Raii Syn. 378. *Triple Ladies Traces.*

It flowers in Autumn. This I have obſerved in ſome of the cloſes about Buddon Wood; alſo in a cloſe near E. Leke, Nottinghamſhire, where the Gentiana, Amarella Linnæi, grows; but it is very ſcarce.

Ophrys bulbo fibroſo, caule bifolio, foliis ovatis, Nectarii labio bifido. Sp. Plant. p. 946.

Ophrys foliis ovatis. Hort. Cliff. 429. Hall. Helv. p. 277. Fl. Sibir. I. p. 25.

Bifolium majus ſeu Ophrys major quibuſdam, J. B. Raii Syn. p. 385.

In woods and meadows flowering in May, but not very common with us. In Hollinghall Wood, near Loughborough, plentifully.

SERA-

SERAPIAS, Gen. Plant. N°. 903.

Serapias bulbis fibroſis, nectarii labio obtuſo crenato petalis breviore. Fl. Suec. 734. Dalib. Par. 276. Sp. Plant. 949.

a. Serapias caule multifolio multifloro. Hort. Cliff. 429. Fl. Sib. I. p. 8.

Helleborine latifolia montana, C. B. p. 186. R. Syn. p. 383.

The moſt common Baſtard Hellebore.

In woods flowering in June. In the moſt northern part of Buddon Wood. In an incloſure adjoining to Beaumanor coppice near Loughborough.

b. Helleborine paluſtris noſtras. Raii Syn. p. 384.

Marſh Hellebore.

In marſhes and boggy grounds flowering in June. Plentifully in the moiſt cloſes between Woodhouſe and Buddon Wood. Upon Charley Foreſt.

MONOECIA.

polyandria.

CERATOPHYLLUM, Gen. Plant. N°. 944.

Ceratophyllum, Hort. Cliff. 446. Fl. Suec. 783. Sp. Plant. 992.

β. Hydroceratophyllum folio lævi octo cornibus armato. Vaill. Raii Syn. 135.

Horſetail Water Milfoil.

In ditches and ponds, but not common with us. I have obſerved it about Loughborough, and always the variety with ſmooth leaves much divided.

The

The Myriophyllum ſpicatum is much more common.

POTERIUM, Gen. Plant. N°. 948.

Poterium inerme, caulibus ſubangulosis, Hort. Cliff. 446. Sp. Plant. p. 994.

Sanguiſorba minor, J. B. III. 2. 113. Raii Syn. p. 203.

Small Burnet.

On dry mountainous paſtures, eſpecially in a chalky ſoil; flowering in June. About Ruddington hills near Nottingham. Upon the banks of the Raw-dikes near Leiceſter. It is abundantly plentiful on all the heaths about Grantham, Ancaſter, and Sleaford, in Lincolnſhire.

DIOECIA

diandria.

SALIX, Gen. Plant. N°. 976.

Salix humilis latifolia et alpina repens, Park. 1432. Fig. 1433. bene.

Salix alpina pumila rotundifolia repens inferne ſubcinerea, C. B. R. Syn. p. 448? An.

Dwarf broad-leaved creeping Willow.

Upon Charley Foreſt, about Beacon and Bardon hills, but not very plentifully.

Among the Linnæan ſpecies, the Salix fuſca. Sp. Plant. 1020. n°. 24. ſeems to anſwer the neareſt to our plant; but as that ſpecies is omitted in the Flora Anglica; we could not with propriety adopt his ſynonym: The figure of the leaf is likewiſe better repreſented by Fig. r. Fl. Lapp.

Tab. 8. than by any other. Haller's deſcription of his Salix foliis lævibus, ovatis, ſpica rariſſima, both in the Enum. Stirp. Helv. p. 154. and in the Iter Helveticum Opuſc. Bot. p. 301, 302. anſwers tolerably to our plant. Sed omnes fere Salicum Species difficillime extricantur.

POLYGAMIA

monoecia.

VALANTIA, Gen. Plant. N°. 1019.

Valantia floribus maſculis quadrifidis, pedunculis diphyllis, Hort. Upſ. 303. Sp. Plant. 1052.
Galium foliis quaternis, floſculis in alis confertis. Hort. Cliff. 34. Hall. Helv. 462.
Cruciata, Ger. 965. R. Syn. p. 223.
Croſswort or Mugweed.

About hedges and buſhes flowering in May and June. This Plant, which I find is but rare in ſome parts of England; grows very common with us almoſt every where.

CRYPTOGAMIA

Filices.

OPHIOGLOSSUM, Gen. Plant. N°. 1035.

Ophioglosſum fronde ovata, Fl. Suec. 839. Sp. Plant. p. 1062.
Ophioglosſum, J. B. III. 708. Raii Syn. p. 128. Hall. Helv. p. 131.
Adder's Tongue.

In moiſt woods, meadows, and paſtures flowering in May. In and about Hallinghall wood near

Loughborough and elſewhere, but not plentifully.

OSMUNDA, Gen. Plant. N°. 1036.

Oſmunda ſcapo caulino ſolitario, fronde pinnata ſolitaria. Fl. Suec. 842. Sp. Plant. 1064.

Lunaria minor, Ger. 328. Raii Syn. p. 128. Barrel. Icon. 252. N°. 3. bona.

Moonwort.

In the cloſes between Okely Wood and Whatton, near Loughborough. In the meadows near Swarſton bridge. Found alſo near Harborough.

Oſmunda fronde bipinnata apice racemifera. Sp. Plant. 1065.

Filix ramoſa non dentata florida. C. B. p. 307. Raii Syn. 125.

Water Fern or flowering Fern, or Oſmund Royal.

In moiſt woods, boggy grounds, and marſhes, flowering in June and July. About Grace Dieu Abbey. Mr. Tomlinſon.

Oſmunda frondibus lanceolatis pinnatifidis: laciniis confluentibus integerrimis parallelis. Sp. Plant. 1066.

Struthiopteris. Hall. Helv. 132.

Lonchitis aſpera minor. C. B. p. 329. Raii Syn. 118.

Rough Spleenwort.

This elegant Plant is plentiful in the outwoods near Loughborough, and in Buddon wood, near Mountſorrel.

ASPLENIUM, Gen. Plant. N°. 1042.

Aſplenium frondibus pinnatis; pinnis ſubrotundis crenatis. Fl. Lap. 388. Hall. Helv. 135. Sp. Plant. p. 1080.

a. Trichomanes ſive Polytrichum Officinarum, C. B. 356. Raii Syn. 119.
Engliſh black Maidenhair.
Upon an old wall in Normanton Town, near Loughborough.

b. Aſplenium pinnis laciniatis. Hall. Helv. p. 136. Trichomanes foliis eleganter inciſis. Tourn. Raii Syn. p. 120.

I find a ſpecimen of this variety among my dried plants, which I think was gathered upon the rocks on Beacon hill, in Charley Foreſt. It correſponds exactly to Pluknet's Icon. Phyt. Tab. 73. Fig. 6.

The Adiantum nigrum Officinarum, J. B. R. Syn. 126, is pretty frequent with us in woods and ſhady lanes at the roots of trees about rocks and old ſtone walls: This ſpecies is frequently ſold by the herb-gatherers for the Trichomanes abovementioned: the miſtake however is of little conſequence, as without doubt both ſpecies are nearly of the ſame quality.

POLYPODIUM, Gen. Plant. N°. 1043.

Polypodium fronde bipinnata: pinnis lunulatis dentatis, ſtipite ſtrigoſo. Roy. Lugd. 500. Dal. Par. 314. Sp. Plant. 1090.

Filix mas non ramoſa pinnulis latis auriculatis ſpinoſis. Ger. em. 1130. R. Syn. 121. Pluk. Phyt. Tab. 179. Fig. 6. optime etiam Tab. 180. Fig. 3.

In the outwoods, and in Hollinghall wood, near Loughborough and elſewhere, but not very common.

Muſci.

England is noted above all other countries for producing a great variety of moſſes; we have diſtinguiſhed at leaſt an hundred different ſpecies, which are all very common with us; but it would be inconſiſtent with our deſign to introduce many of them here: a few which are but rarely met with we ſhall mention.

Bryum, Gen. Plant. N°. 1057.

Bryum antheris erectiuſculis: operculo arcuato, foliis erectis imbricatis, ſurculis ramoſis. Sp. Plant. 1118.

Bryum trichoides, erectis capitulis, albidum fragile. C. Giſſ. 225. R. Syn. p. 97, 29. Hall. Helv. p. 114. 28. Vaillant Bot. Par. Tab. 26. Fig. 13.

I have obſerved this moſs upon Charley Foreſt amongſt the Sphagnum paluſtre Linnæi, which is much more frequent.

Jungermannia, Gen. Plant. N°. 1059.

Jungermannia acaulis fronde lineari: ramoſa; extremitatibus furcatis obtuſiuſculis. Fl. Suec. 928. Sp. Plant. 1136.

Ulva ſaxatilis, furcata, latiuſculis et tenerioribus ſegmentis. R. Syn. 63.

Hepatica

Hepatica arborea globuligera Vaill. Par. 98. T. 23. F. 11.

Marſilea minima Michel. N. Pl. Gen. p. 5. N. 4. Tab. 4. F. 4. Hall. Helv. p. 127.

About the roots of trees among other moſſes, but it is not plentiful with us.

ANTHOCEROS, Gen. Plant N°. 1065.

Anthoceros frondibus indiviſis ſinuatis lævibus. Sp. Plant. p. 1139.

Anthoceros major Michel. N. Pl. Gen. p. 11. T. 7. F. 1. Hall. Helv p. 127.

Lichenaſtrum gramineo pediculo, et capitulo, oblongo, bifurco. R. Syn. p. 10[illegible].

This I have found upon the banks of brooks, and ditches in ſeveral places, but it is not common. It is in heads in April.

LICHEN, Gen. Plant. N°. 1065.

Lichen foliaceus laciniatus obtuſus glaber; ſupra lacunoſus; ſubtus tomentoſus. Fl. Suec. 960. Sp. Plant. p. 1145.

Lichenoides peltatum arboreum maximum, C. Giſſ. 208. R. Syn. p 76.

Lichen pulmonarius arboreus ſive Pulmonaria arborea, J. B. Michel. N. Pl. G. p. 86. Ord. 15. Tab. 45; omnino. Hall. Helv. p. 73. 56.

Lungwort, Oak Lungs.

In Buddon wood about the roots of trees, and upon the rocks; but it is not ſo plentiful as many other ſpecies belonging to the Genus. The Lichen terreſtris cinereus Raii, is very common on all our dry paſtures.

Lichen

Lichen fruticuloſus ſolidus tectus foliolis cruſtaceis. Fl. Suec. 982. Sp. Plant. 1153.

Lichenoides non tubuloſum cinereum ramoſum totum cruſtaceum. R. Syn. 66. N°. 11. forte etiam N°. 12. ejuſdem.

Lichen cinereus fruticoſus, &c. Michel. p. 78. Tab. 53. Fig. 5, 6.

In many places upon Charley Foreſt, and in Buddon Wood particularly.

Lichen fruticuloſus ſolidus ramulis teretibus obtuſis. Fl. Suec. 983. Sp. Plant. 1154? An.

Lichenoides non tubuloſum ramoſiſſimum fruticuli ſpecie rufo nigreſcens. C. Giſſ. 202. Raii Syn. 66.

Lichen terreſtris auguſtior ramoſiſſimus fuſcus Vaill. Bot. Par. p. 115. Michel. p. 78. N°. 17. Hall. Helv. p. 70.

Small brown Coralline Moſs.

Upon the higheſt rocks, on Beacon and Bardon hills, in Charley Foreſt.

Lichen filamentoſus ramoſiſſimus decumbens implicatus opacus. Fl. Suec. 987. Sp. Pl. p. 1155. N°. 74?

Muſcus corallinus ſaxatilis fæniculaceus, M. P. 78. R. Syn. 65. N°. 7. forte etiam, N°. 3. ejuſdem.

Rock Hair.

This continues to grow upon the rocks in Charley Foreſt, as intimated in the Synopſis, where it was firſt found: particularly upon the ſummit of the

the higheſt rocks upon Beacon hill. Alſo upon the rocks near Thrinkſton.

The Lichen hirtus, and floridus Linnæi are both found in our Woods.

Several of the moſſes belonging to this extenſive Genus enter into oeconomical and medicinal uſes; in the latter province the Cup-moſs and the Horned moſs have been celebrated in inveterate coughs, eſpecially the former in the chincough of Children; and Lungwort has been no leſs famous in Conſumptions. The preſent practice, however, regards them but very little, except the aſh-coloured ground Liverwort introduced into practice by Dr. Mead. Their oeconomical uſes are much more extenſive: The orcella forms a branch of trade on account of its uſe in dying: but it is not the only ſpecies that is capable of being applied that way; there are others, which will tinge a purple and yellow colour: and it is to be wiſhed that experiments were made with ſome of them for that purpoſe, as they are ſo plentifully found in our own nation. The common coralline moſs is the principal food of the Rein-Deer, in winter, in the northern countries of Lapland, and even with this alone will they frequently become fat. We have hints of ſeveral other oeconomical uſes of this tribe of plants in the Flora Oeconomica, Amæn. Acad. Vol. I. taken from Linnæus's Itinera; which books we are deprived of the pleaſure of reading on account of their being wrote in the Swediſh tongue. Amidſt the great variety of books much leſs uſeful and entertaining, it is greatly to be regretted that they are not likewiſe tranſlated into a language more univerſally known.

TRE-

TREMELLA, Gen. Plant. N°. 1067.

Tremella plicata undulata. Fl. Suec. 1018. Sp. Plant. 1157.

Ulva terreſtris pinguis et fugax. Raii Syn. p. 64.

Collema ſinuoſa fugax. Hill. Hiſt. Plant. p. 84.

This is not very common with us, I have obſerved it after rain in the paſtures, eſpecially about hedges. Our country people call it Tar-ſlough and ſome of them, as it is principally ſeen after rain, ſuppoſe, as they do in Sweden, that it drops from the clouds.

ULVA, Gen. Plant. N°. 1067.

Ulva tubuloſa ſimplex, Fl. Lappon. 458. Sp. Plant. 1163.

Ulva marina tubuloſa inteſtinorum figuram referens. R. Syn. p. 62.

Linkia paluſtris inteſtini forma tubuloſa. Hall. Helv. p. 62.

Very plentifully in the river Soar about Leiceſter and Loughborough.

Fungi.

FUNGUS. Michel. Nov. Plant. Gen. p. 133. Hall. Helv. p. 34. Amanita Dillen. Cat. Giſſens. p. 177. Agarici ſtipitati Linnæi.

Fungus piperatus albus lacteo ſucco turgens. J. B. R. Syn. p. 4. Hall. Helv. p. 34. Michel. p. 141.

Pepper Muſhroom.

Plentifully

Plentifully in the outwoods near Loughborough, and in Buddon Wood, near Mountſorrel, where I have frequently ſeen them anſwering to the ſize and ſhape of Vaillant's variety, which he calls Fungus lacteus maximus infundibuli forma, Bot. Par. p. 61. N° 8.

Fungus minimus totus albus, pileolo hemiſphærico utrique ſtriato, lamellis rarioribus, Michel. p. 166. N°. 3. Tab. 80. Fig. 11. optime. Hall. Helv. p. 36.

Fungus parvus candidiſſimus, &c. R. Syn. p. 9. N°. 46. etiam N°. 45. ex Dillen.

This ſmall elegant Fungus I have obſerved ariſing from the putrid leaves, in hedge bottoms and in woods. It is exactly repreſented by Micheli's Figure, and anſwers to Vaillant's and Haller's deſcriptions.

Suillus.

Michel. Nov. Pl. Gen. p. 126. Hall. Helv. p. 29.
Boleti ſtipitati Linnæi.

Suillus fulvus inferne ex flavo vireſcens. Hall. Helv. p. 29.

Boletus bovinus, Lin. Sp. Plant. 1177.

Fungus poroſus craſſus, R. Syn. p. 11.

Abundantly in the outwoods near Loughborough. Alſo in Buddon Wood, near Mountſorrel.

This is of the eſculent kind: and Micheli tells us it is ſold amongſt others in the Italian markets. The cows will eat it; but it renders their milk very nauſeous. Fl. Oeconom.

POLYPORUS.

Michel. Nov. Pl. Gen. p. 129. Hall. Helv. p. 25.

Polyporus exiguus coriaceus albus lignis adnaſcens. Michel. p. 130. Tab. 70. Fig. 7.

Boletus albicans, poris tenuiſſimis. Deering Cat. Nottingham. 86.

This I found upon the ſtumps of trees; but it is not common with us. Dr. Deering communicated it to the late eminent Profeſſor at Oxford, who returned it to him with the above name, as a non-deſcript.

HYDNUM, Gen. Pl. N°. 1076.

Erinaceus, Michel. Nov. Pl. Gen. p. 132. Hall. Helv. p. 31.

Hydnum ſtipitatum pileo convexo imbricato. Fl. Lap. 523. Sp. Pl. p. 1178.

Erinaceus eſculentus albus craſſus, Michel. 131. Tab. 72. Fig. 2. Hall. Helv. 31.

Fungus pæne candidus pronâ parte erinaceus, J. B. R. Syn. p. 11.

This I have ſometimes obſerved about Leiceſter; but it is very rare.

ELVELA, Gen. Pl. N°. 1078.

Fungoidis Ordo I. Michel. p. 204.

Elvela pileo deflexo adnato lobato difformi, Fl. Suec. 1103. Sp. Pl. p. 1180.

Fungoides fungiforme criſpum laciniatum et varie complicatum, pediculo craſſo ſtriato rimoſo ac fiſtuloſo, Michel. 204. Tab. 86. Fig. 7.

Boletus petiolo rugoſo pileolo latiſſimo, Hall. Helv. p. 23.

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(1) Dr. Dillenius.

Fungus

Fungus terreſtris pediculo ſtriato et cavernoſo capitello plicatili ſubtus plano, R. Syn. p. 39. N°. 23.

This is not common with us. I obſerved it for three years ſucceſſively on the graſs walks at Burley Hall, near Loughbo:ough.

ÆCIDIUM, Hill. Hiſt. Plant. p. 64.
Lichen agaricorum, Ordo II. Michel. p. 104. Hall. Helv. p. 90.

Æcidium tuberoſum reniforme, Hill. Hiſt. Pl. p. 64.

Lichen agaricus cruſtaceus craſſus, bovillum quaſi renem repreſentans niger, et veluti deuſtus, Michel. p. 104. Tab. 54. Fig. 1. Hall. Helv. p. 90. N°. 6.

Found upon the old trees near Enderby, by John Lewin. I have alſo obſerved it upon the trees about Belton, near Loughborough.

It is found alſo about Nottingham; and in its younger ſtate is what Dr. Deering calls Agaricus niger globoſus nonnihil compreſſus intus albiſſimus ſubſtantiæ tenacis et ligamentoſæ, Cat. Notting. p. 11. This I am convinced of from ſeeing ſome ſpecimens of it in the Doctor's poſſeſſion. Upon old aſh trees about Winwick, Northamptonſhire. Mr. Farmer.

Æcidium, quod Lichen Agaricus bullatus parvus ex obſcuro-nigricans, ſub cute arborum exſiccatarum erumpens, Michel. p. 105. Tab. 54. Fig. 2. Hall. Helv. p. 91.

This I have frequently obſerved upon rotten ſticks in moiſt places.

AGARICUS, Dillen. Cat. Giff. p. 191. Ra. Syn. p. 21. Hall. Helv. p. 59.
Agaricum, Michel. p. 117.

Agaricus ſuperne villoſus et verſicolor, inferne corrugatus et violaceus, Hall. Helv. 59.
Agaricus meſentericus violacei coloris, Cat. Giff. 194. R. Syn. p. 22.
Agaricum ſquamoſum et lichenoſum, &c. Michel. p. 124. N°. 5. Tab. 66. Fig. 4.

Agaricus membranaceus ſinuoſus ſubſtantiæ gelatinæ, Cat. Giff. p. 194. R. Syn. p. 21.
Noſtoc luteum meſenterii forma Vaill. Bot. Par. Tab. 14: Fig. 4. bene.
Both theſe I have obſerved upon rotten wood; but they are not common.

CLAVARIA, Michel. Nov. Pl. Gen. N°. 208. Hall. Helv. p. 14. Hill. Hiſt. Pl. p. 59.
Clavaria lutea minima, Michel. p. 208. N°. 9. Tab. 87. Fig. 5.
Fungoides clavatum minus, Cat. Giff. 189. Raii Syn. p. 14.

Clavaria vermiculata fiſtuloſa candida, Michel. p. 209. Tab. 87. Fig. 13. Hall. Helv. p. 14.
Fungoides clavatum compreſſum ſummitatibus luteis. Dr. Deering Cat. Nott. 75.
Theſe I have ſometimes obſerved in our paſtures; but they are not very common.

CORALLOIDES. Michel. Nov. Pl. Gen. p. 209. Hall. Helv. p. 14.
Coralloides flava, ramis expanſis obtuſis. Hall. Helv. p. 15.

Corallo Fungus flavus, Vaill. Bot. Par. p. 41. Tab. 8 Fig. 4. bene.
Fungus parvus luteus ramoſus, Raii Syn. p. 16.
In the paſtures about Loughborough.

Coralloides, quod Fungus ramoſus minor, colore ſordide flavicante. Raii Syn. 16.
In the paſtures about Woodhouſe, near Loughborough.

XYLARIA, Hill. Hiſt. Pl. p. 62.
Lichen-Agaricorum, Ordo I. Michel. p. 104. Hall. Helv. p. 89.

Xylaria compreſſa extremitatibus divaricatis, Hill. Hiſt. Pl. p. 62.
Clavaria ramoſa cornuta compreſſa, Fl. Suec. 1105. Sp. Plant. 1182.
Lichen-Agaricus nigricans ligno adnaſcens, plerumque multifidus et compreſſus ima parte villoſus, ſuperna vero glaber albidus et pulverulentus. Michel. p. 104. Tab. 55. Fig. 1. optime. Hall. Helv. p. 89.
Fungus ramoſus niger compreſſus parvus, apicibus albidis, R. Syn. 15.
About rotten wood, eſpecially the aſh, not very uncommon. Dr. Haller ſuppoſes that the Fungus niger compreſſus varie divaricatus et implexus inter lignum et corticem, R. Syn. 15. N°. 9. is only the root of the above Fungus ſpreading itſelf, in a reticulated manner, between the bark and the wood. We have frequently obſerved this reticulated Fungus about Leiceſter. It is exactly repreſented by Micheli, Tab. 66. Fig. 3. who has brought it among the Agarics.

GEASTER.

GEASTER.

Michel. Nov. Pl. Gen. p. 220. Hall. Helv. p. 13.

Geaſter medius, radiis plerumquem ultifidis, umbilico ſeu ore ſtellato, Michel. p. 220. Tab. 100. Fig. 5.

Lycoperdon volva ſtellata, radiis multifidis, oſculo ſtellato, Hill. Hiſt. Plant. p. 51.

Geaſter volvæ radiis et operculo elevatis. D. Watſon. Act. Phil. N°. 474.

Lycoperdon volva ſtellata radiis fiſſilibus. Hill. Hiſt. Pl. p. 52.

Fungus pulverulentus Turriculam referens. D. Rand. Blacks. Specim. Botan. p. 24. Tab. 2.

Theſe two elegant Fungi were both found at Hathern, near Loughborough. Mr. Tomlinſon. They were both obſerved for ſome years ſucceſſively.

CXII. *A Letter from Mr.* John Ellis, *F. R. S. to* Philip Carteret Webb, *Eſq; F. R. S. attempting to aſcertain the Tree that yields the common Varniſh uſed in* China *and* Japan; *to promote its Propagation in our* American *Colonies; and to ſet right ſome Miſtakes Botaniſts appear to have entertained concerning it.*

Dear Sir,

Read Nov. 25, 1756.

AS I had a favourable opportunity this ſummer, from my ſituation oppoſite to Mr. Chriſtopher Gray's nurſery garden at



Fig. 1.

Arbor Americana alatis foliis succo lacteo venenata. Pluknet *Phyto. Tab. 145 Fig. 1.*

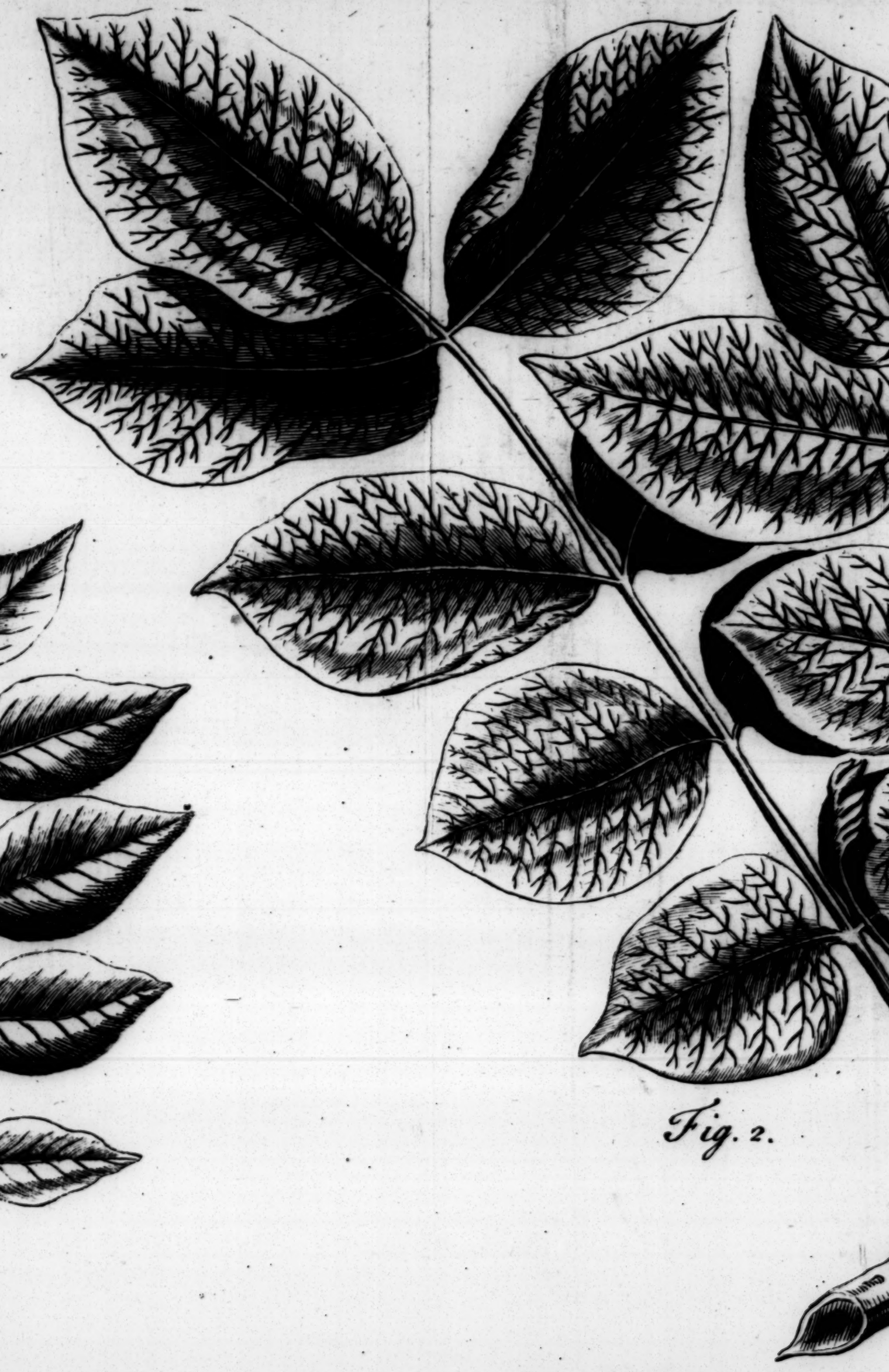


Fig. 2.

Sitz vel Sitz dsju, vulgo Uru

Arbor vernicifera legitima folio pinnato Jugla

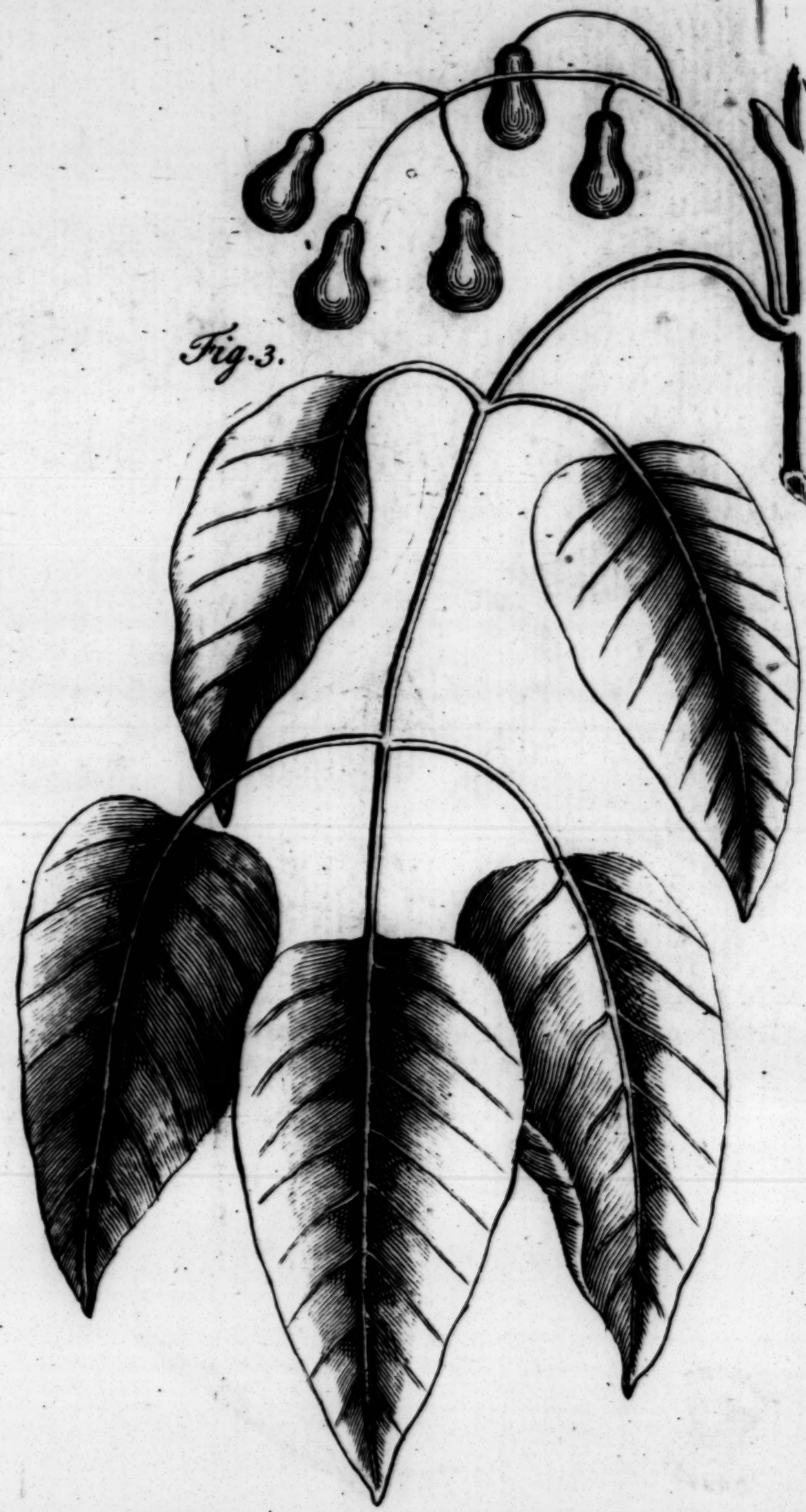
Kæmpferi Amœnitates. p.7



Fig. 2.

u, vulgo Urus, seu Urus no ki.
pinnato Juglandis fructu racemoso Ciceris facie
ænitates. p. 791.

Fig. 3.



Toxicodendron foliis alatis, fructu purpureo pyriformi sparso. Catesby's N. Hist. Vol. 1. p. 40.

J. Mynde sc.

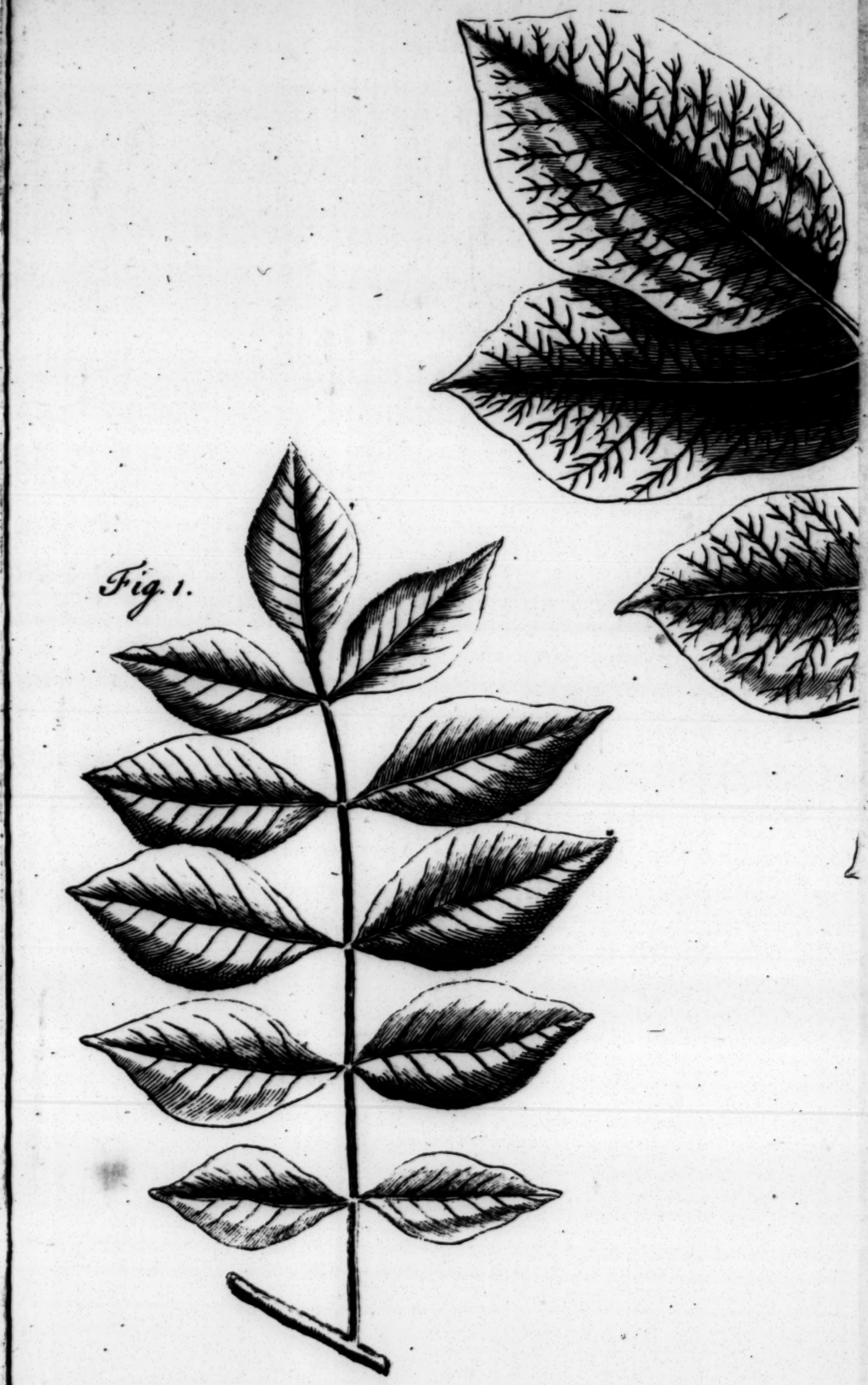


Fig. 1.

Arbor Americana alatis foliis succo lacteo venenata. **Pluknet** *Phyto. Tab. 145 Fig. 1.*

Arbor

at Fulham, to examine his curious collection of exotic plants, I began with the Rhus, or Toxicodendron, in order to the clearing up ſome points diſputed in two letters, lately publiſhed in the laſt volume of our Tranſactions, N°. 49, part I. p. 157 to 166. One from the Abbé Mazeas to Dr. Stephen Hales, on the diſcovery of the juice of certain ſpecies of Toxicodendron ſtaining linen of a fine black colour, and the other in anſwer to it from Mr. Philip Miller, of Chelſea, inſiſting that it was not a new diſcovery.

In order to be ſatisfied of the fact; I made ſeveral experiments on the three ſpecies of Toxicodendrons mentioned by the Abbé Mazeas; and find, that the juices of them do ſtain black, and if fixed by allum are not to be waſhed out by ſoap, or boiling in a lee of pot-aſhes: but the pinnated one called by the gardeners the poiſon aſh, did not ſtrike ſo deep a black as the other two trifoliate ones, being more of a ruſty colour.

I went now upon the enquiry to compare, and ſee, whether in reality this pinnated Toxicodendron of our North American ſettlements, is the true varniſh tree of Japan, as aſſerted by Mr. Miller; and firſt I found it neceſſary to know, where this poiſon tree was deſcribed. This I was led to by Mr. Miller's letter, where he ſays, the poiſonous quality is deſcribed in the Philoſophical Tranſactions, N°. 367. p. 145 and 146, and a very exact (1) figure of a leaf of it therein referred to in Plukenet's Phytographia, Tab. 145. Fig. 1.

(1) Fig. 1. Tab. 24.

In

In order to know what Dr. Kæmpfer has ſaid of this matter, whoſe words Mr. Miller ſeems to depend on, I carefully tranſlated his deſcription both of the (2) true Varniſh tree, and the (3) ſpurious one; and find, that his deſcription of the true varniſh tree, or Sitz, does not agree with this Toxicodendron, which Mr. Miller ſuppoſes to be the ſame; for the leaf-ſtalk or midrib of this, that ſupports the pinnæ or lobe leaves, as well as the under part of the leaves, are quite ſmooth; which is one ſpecific character, that every botaniſt and gardener knows is neceſſary to be obſerved in the proper claſſing the various ſpecies of this genus of plants; many of them being ſmooth, and many of them downy: whereas Dr. Kæmpfer, ſpeaking of the midrib of his true Varniſh tree, calls it, "leviter lanuginoſo," which may be tranſlated, ſomewhat downy: and when he deſcribes the under part of the leaves, he ſays, "dorſo incano "et molliter lanuginoſo," that is, the under part hoary and covered with a ſoft down.

How far the bottom or lower part of each lobe or ſmall leaf anſwers to the drawing he has given of it, I ſhall leave to the curious botaniſt; for he ſays it is, "baſi inequaliter rotundâ," that is, having ſome inequality in the roundneſs of its baſe: whereas the lobe leaves of our American pinnated Toxicodendron come to a point at their footſtalks, nearly equal to that at top; as may be ſeen in Plukenet's figure (4), which I have copied exactly. I have likewiſe copied minutely, for your inſpection, Dr. Kæmpfer's figure

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(2) See Fig. 2. Tab. 24.
(3) See Fig. 4. Tab. 25.
(4) See Fig. 1. Tab. 24.

of

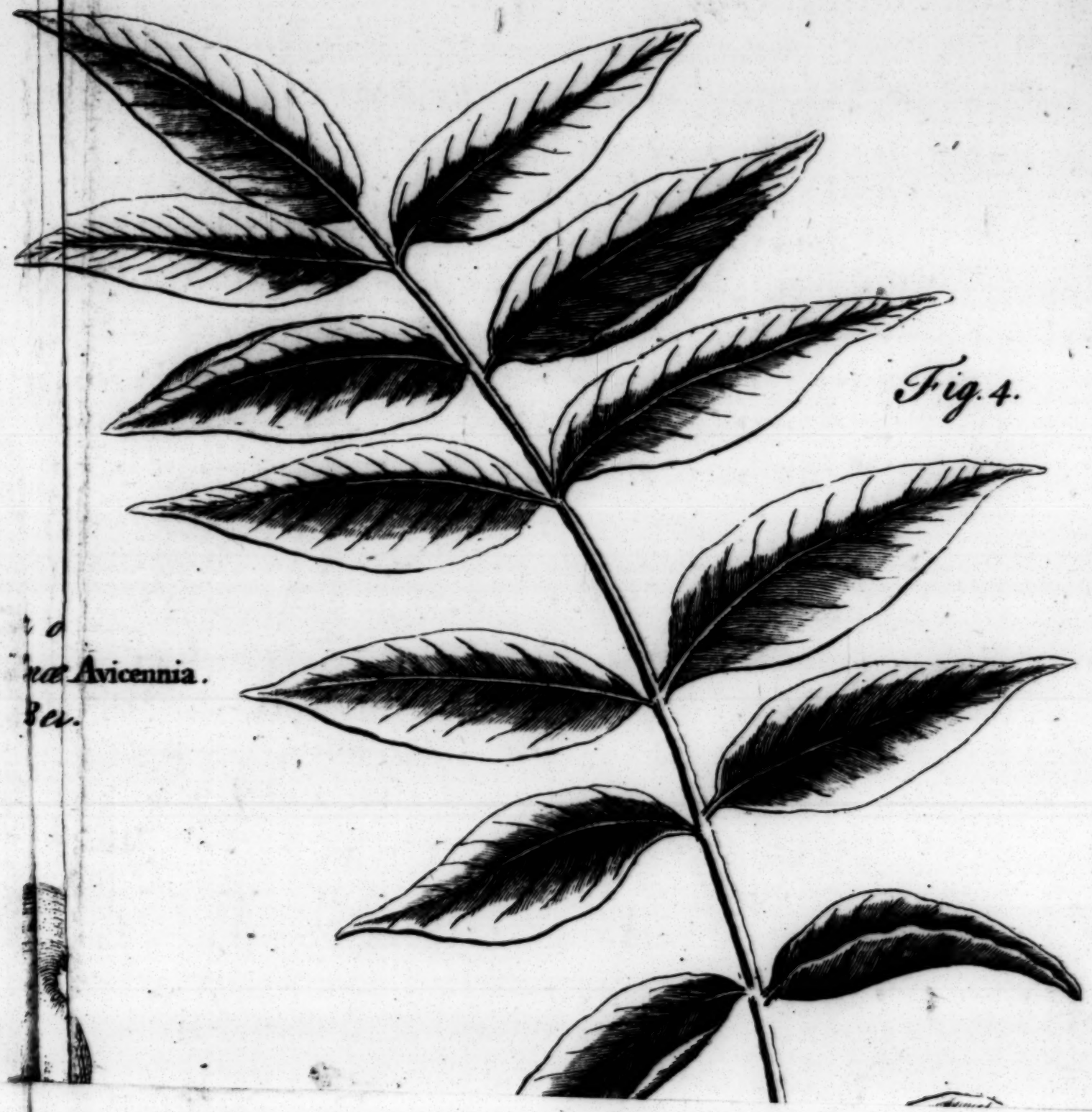


Fig. 4.

ra Avicennia.

Bev.

Rhus Sinense foliis alatis, foliolis oblongis acuminatis ad basin subrotundis & dentatis.

Rhus proliferum hrt.

A Leaf of the Varnish Tree *from Nankin*
raisid from seed by M.r Webb & M.
which Father D'Incarville sent to
the Royal Society
about the Year
1751.

Fig. 6.

Fig. 5.

The Remainder of the Stalk.

The Marking
Anacardium Offici
commonly call'd

The Cashew Nut.
Acajou of Tournefor

om Nankin in CHINA
l. Webb & M.r Miller
rville sent to
ociety
ear

Fig. 6.



The Marking Nut of Inda o
rdium Officinale, call'd by Linnæus Avicennia.
mmonly call'd the Malacca Bea.

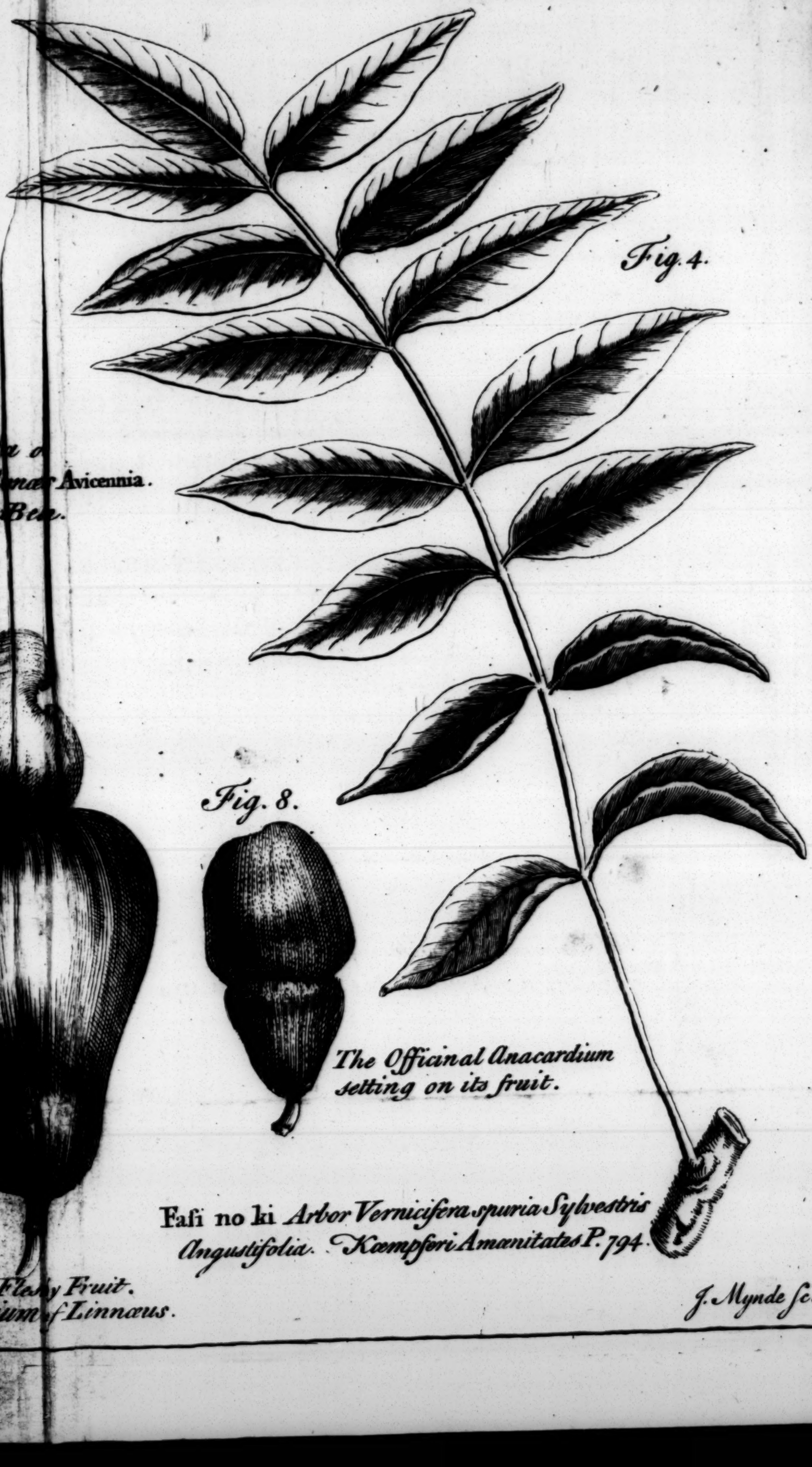


Fig. 4.

Fig. 7.



Fig. 8.

The Officinal Anacardium
setting on its fruit.



Fasi no ki Arbor Vernicifera spuria Sylvestris
Angustifolia. Kæmpferi Amanitates P. 794.

hew Nut sitting on its Fleshy Fruit.
of Tournefort. & Anacardium of Linnæus.

J. Mynde Sc.

of his true Varniſh-tree, on the ſame paper with the other (5).

Dr. Dillenius, late profeſſor of botany at Oxford, has omitted theſe neceſſary characters in his deſcription of the true Japan Varniſh-tree from Dr. Kæmpfer in his Hortus Elthamenſis, where he gives it as a ſynonym for this American pinnated Toxicodendron: whereas had he been exact in the deſcription given it by his author, he muſt evidently have made it another ſpecies. This has miſled the accurate Linnæus, who quotes Dillenius's Synonyms for Kæmpfer's Arbor Vernicifera, or Sitz-dsjù.

As another ſynonym, and in proof of our Poiſon aſh or winged-leaf Toxicodendron being the true Japan Varniſh-tree, Mr. Miller ſays in his letter, that Mr. Cateſby has given a very good figure of it, in his Natural Hiſtory of Carolina, Vol. i. page 40. where he calls it (6) Toxicodendron foliis alatis, fructu purpureo pyriformi ſparſo; but as the bare inſpection into Cateſby's figure of this tree will convince the curious enquirer, whether botaniſt or no, that it cannot be the Poiſon aſh, known to the gardeners, I ſhall only mention, beſides its having a pear-ſhap'd fruit, that I am perſuaded, as are many other perſons ſkilled in theſe things, that Mr. Cateſby never ſaw the bloſſom of this tree ſo as to determine abſolutely the genus of it, or he would certainly have given it to us: and that he does not once ſay, that the inhabitants of Carolina call it the Poiſon tree, or even that it grows among them. I have (Fig. 3. Tab. 24.) given

(5) See Fig. 2. Tab. 24.

(6) See Fig. 3. Tab. 24.

you a ſcetch of a leaf, and ſome of the fruit, which I copied out of Cateſby's Natural Hiſtory, for your own obſervation, that you may compare it with the other figures, to ſave you the trouble of turning to the original.

How near Father D'Incarville, the jeſuit of Pekin's Varniſh-tree, which he ſays grows in the province of Nankin, will agree with the figure Kæmpfer has given us of his Faſi-no-ki, (7) or ſpurious Varniſh tree, which Mr. Miller ſays in his letter are the ſame, I ſhall leave to thoſe gentlemen who may have ſeen it growing in your curious exotic garden at Buſbridge, or at the Phyſic Garden at Chelſea; at both which places it has been raiſed from ſeed received from the Royal Society, ſent by Father D'Incarville a few years ago: but leſt it may not be in the power of every curious perſon to take that trouble, I have ſent you the figure of one of the leaves, which I drew from a ſpecimen I got in your garden. As it has not been yet deſcribed, I ſhall call it (8) "Rhus ſinenſe foliis alatis, foliolis oblongis acu-
" minatis, ad baſin ſubrotundis & dentatis." You'll obſerve the lobes or ſmall leaves are of an oblong figure, pointed at top and roundiſh at the bottom, where they are remarkably jagged with about four teeth. I have joined to the figure of this on the ſame paper an exact copy of a leaf of Kæmpfer's Faſi-no-ki (9), or ſpurious Varniſh-tree, for your own remarks. Kæmpfer takes notice in his, that the middle nerve often divides the ſmall leaves into two

(7) See Fig. 4. Tab. 25.
(8) See Fig. 5. Tab. 25.
(9) See Fig. 4. Tab. 25.

unequal

unequal parts, which is a character I have not obſerved in this China one; nor have I obſerved, that it is of a remarkable fine red in the autumn, as indeed many of the Sumachs are; whereas he gives us a very poetical deſcription of the ſtriking red of this wild Varniſh at that ſeaſon. Dr. Kæmpfer, in the account he gives of his Sitz-dsju, or true Varniſh-tree, takes notice of the effect of its poiſonous exhalations: which brings freſh into my memory that this China Rhus, when firſt it began to extend its leaves in your ſmall ſtove, had ſo remarkable a diſagreeable ſmell, that I have frequently complained to you of getting the head-ach and a ſickneſs at my ſtomach by remaining too long near it; and after you had it removed into your great ſtove, where, notwithſtanding that building is very ſpacious, and near twenty feet high, yet, as it grew moſt luxuriantly, one could not without pain continue long near it. I meaſured one of the whole great leaves of this tree in the ſummer 1755, and it was above three feet in length. I ſuppoſe, as it is a native of Nankin, where the winters are cold, it thrives now well with you in the open air, as it does in the Phyſic Garden at Chelſea; where it throws out, like yours, a great number of ſuckers.

After Dr. Kæmpfer has deſcribed the true Japan Varniſh-tree, he then tells us, that the Varniſh is collected from it near the city of Jaſſino, and that it is the beſt Varniſh in the world; but that it is in ſo ſmall quantities, that there would not be ſufficient for their own manufacturies, were it not for a baſer kind of Varniſh, which is brought to them from Siam, and called Nam-Rak. This Siam Varniſh he

tells us, is got in the province of Corſima and kingdom of Cambodia, from the tree Anacardium, called by the inhabitants Ton-Rak, that is, Tree-Rak. The fruit of this tree he ſays expreſly is called in our ſhops Anacardium: his words are, "cujus fructus "officinis noſtris Anacardium dictus (10)."

In Mr. Miller's anſwer to the Abbé Mazeas he ſays, this Varniſh is produced from the Anacardium, or Caſhew nut-tree: and recommends it to the inhabitants of our ſouthern colonies in America to draw this Varniſh from it, as a national advantage.

In order to know what kind of tree bears this officinal Anacardium, I conſulted Linnæus's Materia Medica, and Species Plantarum; and there I find it a quite different genus of plants from the Acajou or Caſhew nut-tree of Tournefort. He calls this oriental Anacardium, Avicennia; and has given its characters at large in his Genera Plantarum, and ranks it among the Tetrandia monogynia; whereas the occidental Anacardium or Caſhew nut-tree of the American iſlands he calls Anacardium, and ranks it among the Decandria monogynia.

As the printers or ſtainers of callicoes in the Eaſt-Indies make uſe of ſome black dye, that holds its colour, and does not impair their cloths, I tried ſome freſh nuts of this oriental Anacardium, and found, that not only from my own experience, but lately from the confirmation of many gentlemen in the Eaſt-India trade, that a fine black colour, which will not waſh out, is ſtruck on cotton and linen with the

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(9) See Fig. 6. Tab. 25.

juice

juice of the ſhell of this nut. They are known all over India by the name of Marking-nuts, and are ſold for that purpoſe in their bazars or markets, the figure of which is annexed, N°. 6. Tab. 25.

At the ſame time I tried the acrid oily ſubſtance of the ſhell of ſome freſh Caſhew-nuts (11), and obſerved, that it gave no colour to linen, but remained like oil of olives on it.

I have heard indeed, that the juice of the fleſhy fruit that ſupports the Caſhew-nut will ſtain the lips black, and perhaps it may linen; but the gum or liquor which proceeds from the tree is agreed by later (12) authors to be of the ſame nature and mechanical uſe with gum arabic; and conſequently will diſſolve in water; which would render it improper for Varniſh. The figure of the Caſhew-nut and its fruit are annexed, N°. 7. Tab. 25.

Dr. Kæmpfer further obſerves, that the quantity of Varniſh obtained from this officinal Anacardium tree is ſo great, as not only to ſerve to varniſh all the utenſils of China, Tonquin, and Japan, but that it is exported in wooden veſſels to Batavia, and ſeveral other parts of India. It is not improbable therefore that this is the Varniſh mentioned by Father D'Incarville in the Philoſophical Tranſactions, Vol. 48. part I. p. 254, called Toeng-yeou; which is ſo univerſally uſed in China for preſerving and ornamenting their furniture.

I muſt now confeſs to you frankly, that I cannot find, after carefully conſidering and examining Mr.

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(11) See Fig. 7. Tab. 25.

(12) See Brown's Nat. Hiſt. of Jamaica, p. 225.

Miller's letter, that he has brought any proof to leſſen the merit of the Abbé Mazeas and the Abbé Sauvage's diſcoveries: and the uſe I would propoſe to you from the remarks I have made, is, that, as our Premium Society for the encouragement of Arts and Sciences have a ſcheme on foot to promote the growth of many really uſeful vegetable productions, which are at preſent brought to us, at a great expence, from Spain, France, Italy, the Levant, Africa, and the Eaſt-Indies; I think this Anacardium orientale, or Avicennia of Linnæus, claims a place among the reſt; eſpecially, when we conſider of what uſe and importance it is in the two great empires of China and Japan, beſides all the other parts of India. The chief difficulty will be the preſerving its vegetative quality during two ſo long voyages; but by many contrivances I am perſuaded it will at laſt be effected; however the very attempt is laudable.

Since I wrote the above I have received a ſpecimen of the gum of the Caſhew-nut tree, and find it diſſolves in the mouth like gum arabic. It is of the colour of Myrrh; but very brittle, ſhining, and clear. I have alſo procured a ſpecimen of the Varniſh of China from Mr. Margas, a great dealer in China commodities, juſt as it was imported from thence: this ſeems to anſwer the deſcription of the Siam Varniſh. I have made ſome experiments on it, and find it does not diſſolve by being put either into water or ſpirits of wine.

And further, Dr. Sibthorp, profeſſor of botany at Oxford, informs me in a letter I received lately from him, that they have no ſpecimen of the Sitz, or true Varniſh-tree of Japan' in the Sherardian collection,

lection, as mentioned by Dr. Dillenius; but that they have one of the Faſi-no-ki, or ſpurious Varniſh-tree of Kæmpfer, with the ſynonym, "Toxicoden-"dron foliis alatis fructu rhomboide, Hort. Eltham:" inſcribed under, "from Japan:" and that it reſembles much our American one. So that Mr. Miller's obſervations on his Toxicodendron, or Poiſon aſh, may be proper in the ſixth edition of his Dictionary, but not in his letter above-mentioned, where he makes the ſpurious Varniſh-tree of Japan, or Faſi-no-ki, the ſame with the Nankin Varniſh-tree, of which the Jeſuits of China ſent the ſeed over to the Royal Society a few years ago: whereas they are utterly unlike each other. Dr. Dillenius was perhaps led into this error by depending on the report made to Dr. Kæmpfer on the common people of Japan; which was, that the true Varniſh-tree degenerated into the ſpurious one for want of culture. But I believe our knowlege in this ſcience is ſo much improved, that ſuch doctrines are not eaſily admitted among our gardeners (whatever varieties may poſſibly ariſe from ſeed); and in this I am perſuaded Mr. Miller will agree with me, that the two ſorts of Varniſh-trees, mentioned by Dr. Kæmpfer, are two diſtinct ſpecies of Rhus, or Toxicodendron, and will ever remain ſo, let the ſoil be either good or bad that they are planted in. I am,

Dear Sir,

Your affectionate humble ſervant,

Lawrence Lane,
Nov. 8, 1756.

John Ellis.

P. S.

P. S. Since I wrote the above I received a parcel of the officinal Anacardiums, which had been lately brought from the Eaſt-Indies. Theſe have their fleſhy fruit with their ſtalks ſtill adhering to them. The better to illuſtrate this matter, I have given a figure of one of them, Tab. 25. Fig. 8. The manner of the growth of this fruit evidently ſhews, that it cannot be the Oepata of the Hort. Malab, Vol. 4. p. 95. Tab. 45. as quoted by Dr. Linnæus; the whole nut of which is incloſed in a fleſhy coat, like an almond. It ſeems to come neareſt to the Caſſubium Sylveſtre of Rumphius, Hort. Amboin. Vol. 1. p. 179. Tab. 70.; where, beſides the figure and manner of growth of the fruit, he mentions, that they varniſh their warlike and other kinds of wooden inſtruments, of a black colour, with the milky juice which they draw from this tree; and that they mark themſelves on their arms and other parts with the corroding juice of the nut, which continues a long time before it diſappears.

Rumphius further particularly deſcribes this plant to be of the Pentandria monogynia of Linnæus's method; ſo that it muſt differ intirely from the Anacardium Occidentale, which belongs to the Decandria monogynia of that author.

He likewiſe makes this remark, that the Caſhew-tree, or occidental Anacardium, is not a native of the Eaſt-Indies; but has been brought thither by the Portugueſe, from the Braſils: and that they are no-where to be found in thoſe parts, but where they have had their ſettlements.

CXIII. *A Letter to* George Lewis Scot, *Eſquire, concerning the preſent Increaſe of the People in* Britain *and* Ireland: *From* William Brakenridge, *D. D. Rector of* St. Michael Baſſiſhaw, London, *and F. R. S.*

Dear Sir,

Read Dec. 9. 1756. YOUR favourable acceptance of my two former letters, concerning the number of people in this city, and throughout England, has encouraged me to add this as a ſupplement to them; in which if the obſervations are not ſo agreeable as could be wiſhed, they may perhaps be uſeful in our reaſoning upon matters of Government, and help us to diſcover ſome things that may be wrong, or inconſiſtent with the public utility.

From the proportion of births and burials in England, and the number of people found, you have already ſeen what the annual increaſe might be; which appeared ſo ſmall, that I was in ſome doubt whether there was any increaſe at all, after the deduction of our loſſes by our ordinary commerce at Sea, our wars, and emigrations to our Colonies. However, ſuppoſing, that there was an annual increaſe, I ſhewed the method of computing it, after any number of years; which ſometimes may be of uſe in conſidering the increaſe of mankind in general. But now, having conſidered this ſubject farther, I think it may be proved, that there is no increaſe at

all from both our Britiſh Iſles, after the deduction of our loſſes; and that in England, taken by itſelf, the natives would be in a decreaſing ſtate, if it were not for the ſupplies from Scotland and Ireland. As this ſeems to be of ſome importance to diſcover, becauſe of its conſequence with regard to Policy, and the influence it may ſometimes have, I ſhall endeavour to ſhew it as plainly, as the preſent circumſtances of things will allow.

Dr. Halley has ſhewn, from his Table of the Probabilities of life at Breſlau, that the number of men able to carry arms in any country, between 18 and 56 years of age, or, as they are called, the fencible men, may be eſtimated as a fourth part of the whole people, children included. From which it demonſtrably follows, that the fourth part of the annual increaſe will likewiſe be the increaſe of the fencible men; and that their increaſe or decreaſe will always be in that proportion. And therefore, if in England the annual increaſe of the people does not exceed 18000, as I have before proved from the proportion of births and burials, and the whole number being ſix millions, the annual increaſe of the fencible men will not be above 4500.

But in Scotland and Ireland this increaſe may be reaſonably ſuppoſed to be more, in proportion as there are more marriages than in England. And therefore, to avoid any uncertainty in calculation, we will ſuppoſe the annual increaſe in thoſe countries, to be double in proportion. That is, as we have from obſervation, aſſumed the births to be to the burials as 112 to 100 at an average through England, we will now allow them in Scotland and

Ireland

Ireland to be as 124 to 100; where the difference, which is the increaſe, is double to the other, and by which the whole people would be doubled in about 114 years; which is ſurely as much as can be ſuppoſed. And then, by the method that has been ſhewn in my laſt letter, if the people in both countries do not exceed 2,500,000, the annual increaſe will be found to be 15,000, and the fencible men will be 3750.

From the account given in the Philoſophical Tranſactions, N°. 261, the number of people in Ireland, in the year 1696, did not appear to be more than 1,034,000; ſince which time there has been little increaſe, as I ſhall preſently ſhew; and in Scotland they are ſuppoſed to be leſs than 1,500,000; and ſo both together they cannot be reckoned at more than 2,500,000: and therefore the annual increaſe of the fencible men cannot poſſibly be more than 3750, in both countries; which with thoſe in England will be 8250, for the annual increaſe in Britain and Ireland, or a little above 8000 men. And no reaſonable computation can make them more.

It is true it may be ſaid, that beſides this increaſe, there is a conſiderable number of Foreigners, who come from all parts of Europe to ſettle among us, eſpecially at London; but it may be juſtly ſuppoſed, that they are nearly ballanced by the number that go from hence, to reſide in other kingdoms, for the purpoſes of trade and other conſiderations. And there cannot be ſo great an acceſſion of Foreigners, as is commonly imagined; for they almoſt all come to this City, and yet it is not in an increaſing ſtate, as has been ſhewn in my firſt letter, notwithſtanding

all its ſupplies from them, and from Scotland and Ireland.

The number then 8250 may be conſidered, at the utmoſt, as the yearly increaſe of the fencible men; from which all our public loſſes in our ordinary commerce at Sea, and in our wars by Land and Sea, and by our Colonies, are to be deducted. And it is plain, if in all theſe ways our loſſes are annually equal to about 8000 men, there can be no increaſe at all of our fencible men; and conſequently no increaſe of our people, which muſt always be in proportion to them; but if our loſſes are more, we muſt be in a decreaſing ſtate.

To make a juſt and moderate eſtimate of our loſſes it will be proper, that we take fifty or ſixty years at an average to avoid any uncertainty. And if we begin at the year 1690, which is 66 years ago, we ſhall find, that during that time, in our commerce at Sea, and in our wars by Land and Sea, we cannot have loſt leſs than 450,000 men.

To ſhew this it may be obſerved, that in all bodies or armies of fencible men, which conſiſt generally of thoſe between 18 and 56 years of age, there dies annually about one in 54, by the natural decreaſe of life, as appears from Dr. Halley's Table. And therefore, if there are 80000 ſeamen or more, as is ſaid in Britain and Ireland, the natural decreaſe, which is not here to be conſidered, will be about 1480 or 1500 annually. But the number muſt be much greater that is loſt, by the various contingencies of the Sea, by wreck, ſcurvy, and the inclemency of different climates, &c; for fewer cannot be ſuppoſed to be deſtroyed by ſuch incidents, than the

double

double of thoſe that may be by natural mortality. I think there muſt be more; for if a ſhip goes a voyage for a year with an hundred men on board, and returns only with the loſs of half a dozen, ſhe is reckoned to have made a healthy voyage, though the loſs is above three times what might be expected from natural decreaſe; that is, though the loſs by the Sea only may be conſidered as double the other. And it often happens, that by ſickneſs there will be much more than this, beſides all the other hazards of the Sea. Our ſhips of war in long cruiſing have generally a greater conſumption of their people: So that our loſſes by Sea are rather undervalued, when they are eſtimated to be the double, of what is from the natural decrements of life. And, if this be allowed, the loſs by the various contingencies of the Sea will be more than 3000 annually, over and above the number that might die by natural caſualties if they were at home; and in 66 years it muſt be 198,000.

And as to our loſſes by war at Land and Sea, of our own people, they are commonly reckoned to be 300,000, in all the three French wars, ſince 1690: But if we abate 50,000 from that number, that we may reaſon with more certainty, they cannot poſſibly be leſs than 250,000; for in all thoſe wars, that taken together were about twenty years, there muſt be more than 10,000 loſt yearly by Land and Sea. And therefore, both by our commerce and wars, from that time mentioned, we have at leaſt loſt about 448,000, or 6800 annually. In which are included thoſe who died by fatigue, and other hardſhips, as well as thoſe in actual Engagements.

And

And if we add to this, the number that is conſtantly and ſecretly drawn from Ireland, for foreign military ſervice and on the account of religion; and likewiſe thoſe taken from Scotland, for our Regiments in the Dutch ſervice; all which cannot be leſs than 500 yearly, though ſome have thought it to be double this, we ſhall then appear to have loſt 7300 annually, ſince the year 1690. To which if we put the loſs of thoſe who go from hence to our Colonies, and other ſettlements, particularly to Jamaica and the Eaſt-Indies; and, laſt of all, the number we have loſt by the uſe of ſpirituous liquors; it will be plain, that our whole loſs cannot be leſs but more than 8250 annually; which is at moſt the yearly increaſe of our fencible men: And therefore that there has been no increaſe at all of our people theſe laſt 66 years; but rather perhaps a decreaſe, though it cannot be aſcertained with any preciſion. And there is no avoiding this concluſion, unleſs it can be ſhewn, that the annual increment of our fencible men is much greater than 8250; which ſeems impoſſible, without proving the number of our people to be more than ſix millions, and the proportion of births to burials greater than any obſervations through England have lately made them.

And here it is to be obſerved, that if there has been no increaſe during that period of years, the people of England cannot be more than 5,500,000. Becauſe, when they are computed from the number of houſes at the year 1710, they do not exceed 5,467,000; and when in my laſt letter, I ſuppoſed there might be ſome increaſe, and gave a calculation of it to the preſent time, that, being added to the above,

above, made only about ſix millions. And therefore the annual increaſe of fencible men in England is not above 4130, and in both Iſlands it does not exceed 7900; which being leſs than what we have allowed above, ſeems to corroborate what has been ſaid.

Now if this can be proved, as I imagine it has, that there is no increaſe of our people in Britain and Ireland, becauſe of our loſſes, we may make this unpleaſant reflection, that our country can never be fully peopled, while our loſſes continue ſo great as they have been theſe laſt ſixty years. For it has been ſhewn in my laſt letter, that we want one third more people, to be fully inhabited, and which we could conveniently maintain from our own natural produce, if our land was duly cultivated. And it may be farther obſerved, that as the greateſt part of thoſe loſſes above-mentioned belong to England, becauſe of its much greater trade, and the greater number of its people, it may be conſidered as in a decreaſing ſtate with regard to its natives; and, if it were not ſupplied from Scotland and Ireland, the decreaſe would be plainly diſcovered. For, as the people in England are double to thoſe in both the two other countries, its loſſes muſt be in that proportion at leaſt, or about 5300 annually, two-thirds of the whole; which is more than the increaſe of its fencible men.

In London and Weſtminſter the decreaſe has been obſervable from the Bills of Mortality within theſe laſt twelve years, as I have ſhewn in my firſt letter; but the greateſt part of that may, I believe, be attributed to other cauſes, rather than national loſſes.

From

From the above calculation we may likewiſe ſee, how ſmall the annual increaſe of fencible men may be in Britain, or perhaps in any other country in Europe. For as that increaſe in both our Iſlands does not appear to be more than 8250, but rather leſs, or about 7900, and the number of our whole people in them is not found to exceed 8,000,000, the annual increaſe in each million muſt be leſs than 1000, or about 987; that is, leſs than one in a thouſand; though we have allowed the increaſe in Scotland and Ireland to be double in proportion to what it is in England. And from this we may form a good rule, by which we may judge of the increaſe, or decreaſe of other nations. For though they may be ſuppoſed to increaſe perhaps faſter than we do, by more frequent marriages, the annual increaſe of their fencible men will not generally much exceed 1000, for every million of people. And therefore, according as their loſſes by war, or other devaſtations are fewer, or exceed 1000 fencible men annually, for every million of their people, they are either in an increaſing or decreaſing ſtate; and for every 1000 men that are loſt, there is the increaſe of a million for one year deſtroyed; which it were to be wiſhed, that Princes would attend to, in their ambitious ſchemes, by which they make ſuch havock of mankind.

And hence by the way we may obſerve, that France cannot be in an increaſing ſtate, unleſs their late encouragement for marriage has had ſome conſiderable effect; becauſe if the number of her people, as Sir William Petty and others have reckoned, does not exceed 14,000,000, the annual increaſe of her fencible

fencible men will not be much more than 14,000: Which number ſeems to be exhauſted during theſe laſt 66 years, in her frequent wars, her ordinary commerce at Sea, and emigrations to her Colonies. For all the annual increments put together, in that time, will not make above a million, and the loſſes cannot be computed at much leſs. And this is ſome comfort to us in Britain, that our neighbours, who are rivals to us in trade and power, are not better œconomiſts of their people than we are; and that their ſcheme of Government and ſuperſtition will never ſuffer them to increaſe, ſo much as they might reaſonably do.

We may in general likewiſe obſerve, that in all Europe the annual increaſe of people muſt be much leſs than it was in ſome former ages. For the advancement of trade in the maritime countries, muſt greatly augment the loſs of their fencible men. In Britain there is one-third of the increaſe of them deſtroyed by our concerns at Sea, and in Holland perhaps the whole of it; and this added to the ſuperſtitious celibacy of other nations, muſt diminiſh much the increaſe of people.

The above method of ſhewing our want of increaſe, from the loſſes of our fencible men; which are always in proportion to the whole body of the people, ſeems to me to be clear and demonſtrative: But the ſame thing may likewiſe be conjectured, from the exportation of our corn. For there is as much now ſent abroad as was forty years ago, or perhaps more; beſides a great deal of it diſtilled, which was not formerly done. And if there is the ſame quantity exported, there muſt be nearly the ſame con-

ſumption at home, and conſequently about the ſame number of people, unleſs there is a much greater quantity of land improved. But it ſeems evident, that if we were in an increaſing ſtate, our late improvements of land could not cauſe ſuch a ſurplus, over our home-conſumption. For there is near about a fifth part, of our whole crop of wheat exported annually. A quantity that ſhews we want people to conſume our natural produce, and that our country is but thinly peopled.

Now, to account for the cauſe of the want of increaſe in our Britiſh Iſles, it ſeems to be chiefly owing to three things, that operate together. The faſhionable humour that greatly prevails, by which above one-third of our people in England above twenty-one years of age are ſingle, occaſioned by a variety of circumſtances; and to our wars and commerce at Sea, which are rather beyond our natural ſtrength, by deſtroying more of our people than can well be ſpared, and which, if preſerved, might improve our country, and augment our power; and laſtly, to the uſe of ſpirituous liquors, by which numbers have been and are daily loſt. But there may be eaſy remedies for two of thoſe evils, by a little attention of the Legiſlature; which would greatly conduce to the public happineſs.

And thus, Sir, I have wrote this third Letter to you, upon a very uncommon ſubject: but I hope the importance of it will plead my excuſe. And if I have diſcovered any thing that has not been known, and that may be uſeful in our ſpeculations upon Government, I ſhall think my time and pains have

not been misapplied; but if I have been mistaken, your usual goodness will, I trust, forgive

Your most affectionate

and faithful servant,

Sion College,
Nov. 25, 1756.

Wm. Brakenridge.

P. S. Since the above was written, I have been certainly informed, that from the survey lately made of the window lights, after the year 1750, there are about 690,000 houses charged to that Tax in England and Wales, besides cottages that pay nothing. And though the number of cottages is not accurately known, it appears from the accounts given in, that they cannot amount to above 200,000. And therefore there are not in England and Wales more than 890,000 houses, or 5,340,000 people, allowing six to a house; which well agrees with what I have said in this and my former letter, and corroborates the whole of my reasoning. For if the survey made before the year 1710 was near the truth, from which it appeared, that there was not above 729,048 houses, besides cottages, or 929,048 houses in the whole; which will make about 5,570,000 people; then there must have been no increment since that time, but rather a decrease, notwithstanding the continual supplies from Scotland and Ireland, and from Foreigners.

I beg leave likewise to mention, that I find some people have objected to the Bills of Mor-

tality, from which I computed our numbers in London and Weſtminſter, in my firſt Letter; That they are too uncertain to found any calculations upon; that ſometimes in the weekly Bills there are omiſſions of ſome of the largeſt Pariſhes, and perhaps in the yearly Bills. To which it is anſwered. If there are omiſſions ſometimes in the weekly Bills, theſe are afterwards ſupplied in the ſubſequent weeks, and at the end of the year the whole account to each pariſh is made up, as accurately as the circumſtances will allow; ſo that upon the whole it is preſumed, the yearly Bills are done in ſuch manner, that they may be depended upon; for otherwiſe they would be a vile impoſition upon the Publick. And if they are properly taken care of, they may be conſidered as the index of the health and numbers of the people, as they are in other cities in Europe; in which view they have always had ſome credit, for a century paſt, and been attended to as of ſome importance; and many ingenious men have deduced uſeful ſpeculations from them. But if it ſhould be allowed, that there are inaccuracies in them, it cannot reaſonably be ſuppoſed, that there are more now than ever have been; for there is as much care taken of them lately as ever.

The argument then from which I inferred, that there is a decreaſe of the inhabitants within the Bills is this; That, before the year 1743, for twenty years, the burials in them were at an average above 27,000, and the baptiſms between 15,000 and 17,000; but ſince that time they are both gradually decreaſed; ſo that now the burials

burials are about 22,000, and the baptiſms between 14,000 and 15,000, taken at an average for ten years: And therefore theſe different numbers, continued ſo long, cannot come from the ſame number of people; but that as the burials and baptiſms are both decreaſed, the whole people muſt be alſo diminiſhed. This ſeems be fair reaſoning, if the Bills are true. The times were as healthy before the year 1743, as ever ſince; there were as many burials carried out into the country before that time as afterwards; and there were as many Diſſenters to leſſen the number of burials and baptiſms before that time as ever after. What then is to be concluded, the circumſtances being the ſame, but that there muſt be a diminution of the people? And this may be imperceptibly made; either by the increaſe of celibacy, or by fewer coming annually to reſide in Town than formerly, and more retiring from it; which laſt caſe I conſider rather as an advantage to the kingdom, as it may tend to the improvement of the country.

It is true, we do not ſee ſo great an increaſe of empty houſes, that may anſwer to the decreaſe in the Bills; but it may be eaſily imagined, that ſome hundreds of families may be diminiſhed, and not one houſe left empty. The one half of our people conſiſt of Lodgers, Inmates, and Children; and therefore there may be a great decreaſe of theſe, and yet not many more houſes empty: Though it is alſo to be conſidered, that there are much fewer houſes now within the Liberties of the city, than were before 1743; many being built in place of two or three, or more, and ware-

houſes

houſes made of others. I know ſome Pariſhes, in which they have loſt one tenth of their number, by this means, ſince that time; ſo that within the walls I find there is above double the number loſt, that I mentioned in my Letter. To live in large houſes is now a part of our luxury. But if there be an increaſe of houſes in Padington, Mary le bone, &c. without the Bills of Mortality, this does not affect my argument; which was only to ſhew, that there was a decreaſe of the people within them; and ſurely ſuch a ſmall increment is not to be compared to the probable decreaſe on the whole.

In that firſt Letter I reaſoned, and made my calculation, upon the ſame principles with Sir William Petty, Mr. Graunt, and other approved Authors. From a continued increaſe in the Bills they inferred, that there muſt be a proportional increaſe of inhabitants; and I from the continued decreaſe in them, in the ſame circumſtances, have endeavoured to prove a ſimilar decreaſe of people. If their reaſoning is juſt, mine cannot be falſe; and if the Bills never again appear ſo high, as formerly for a continuance, in healthy times, it will be a demonſtration.

CXIV. *A Letter to the Reverend* William Brakenridge, *D. D. Rector of* St. Mich. Baſſiſhaw, *and F. R. S. with a Table of the Value of Annuities on Lives, by Mr.* James Dodſon, *Maſter of the Royal Mathematical School in* Chriſt's-Hoſpital, *and F. R. S.*

Reverend Sir,

Read Dec. 16. 1756. AS I have made a great many calculations, relative to Annuities on Lives, and have otherwiſe contributed, as much as was in my Power, to facilitate the performance of ſuch, I thought it, almoſt a duty incumbent on me, to compute the values of them according to your curious Table of the Decrements of Life, inſerted in the Philoſophical Tranſactions; accordingly I have incloſed a table of them, and if you find it will bear examination I deſire you to communicate it to the Royal Society, in order (if approved of) to its being inſerted, as an appendix to your letter to the Preſident. I am,

Reverend Sir,

Your moſt obedient and

moſt humble Servant,

Chriſt's-Hoſpital,
Dec. 8, 1756.

James Dodſon.

A Table

A Table of the Value of an Annuity of One Pound, payable yearly, during a Life of any Age, allowing compound Intereſt at 4 l. per Cent. per Ann. *computed from the Table of the Decrements of Life, conſtructed by the Reverend* William Brakenridge, *D. D. F. R. S. inſerted Page* 181.

1	12,510	23	15,865	45	11,800	67	6,338
2	15,001	24	15,688	46	11,580	68	6,007
3	16,001	25	15,504	47	11,360	69	5,670
4	16,781	26	15,313	48	11,190	70	5,399
5	17,470	27	15,112	49	10,960	71	5,139
6	17,712	28	14,951	50	10,780	72	4,895
7	17,800	29	14,784	51	10,540	73	4,677
8	17,821	30	14,612	52	10,350	74	4,395
9	17,800	31	14,433	53	10,170	75	4,130
10	17,781	32	14,280	54	9,938	76	3,895
11	17,671	33	14,090	55	9,694	77	3,708
12	17,560	34	13,890	56	9,444	78	3,603
13	17,453	35	13,740	57	9,186	79	3,468
14	17,291	36	13,580	58	8,918	80	3,261
15	17,171	37	13,420	59	8,643	81	3,146
16	17,000	38	13,210	60	8,361	82	2,923
17	16,855	39	12,960	61	8,071	83	2,508
18	16,716	40	12,780	62	7,839	84	2,084
19	16,525	41	12,590	63	7,541	85	1,651
20	16,379	42	12,400	64	7,234	86	1,210
21	16,221	43	12,190	65	6,920	87	0,762
22	16,061	44	11,980	66	6,598	88	0,320

CXV. *An Account of an Earthquake felt at* Colen, Leige, Maeſtricht, *&c. on the* 19*th of* November, 1756: *In a Letter from Mr.* Abraham Trembley, *F. R. S. to* Thomas Birch, *D. D. Secretary to the* Royal Society. *Tranſlated from the* French.

SIR, Hague, Nov. 26, 1756.

Read Dec. 16. 1756. THERE was felt, on the 19th of this month, at three in the morning, a ſhock of an earthquake, at Colen, Leige, Maeſtricht, in the country of Limburg, and, as appears, in all that between the Meuſe and the Rhine.

This ſhock continued but a ſhort time; and there is no account at preſent of any damage done by it.

One of almoſt the ſame kind was felt in the ſame places on the 3d of June.

You ſaw by the account, which I ſent you on the 11th of May, that earthquakes were very frequent in this country in the beginning of this year. The ſhock, which has been lately felt in theſe parts, as well as in Portugal, ſhews, that the cauſe of earthquakes is ſtill active.

I have not yet procured the ſequel of the obſervations made in Valais on that ſubject.

I know, that perſons very attentive obſerved, that in the neighbourhood of Liſbon for ſeveral days after the 1ſt of November 1755, thoſe, who lay upon the

ground, perceived a motion under them, which they compared to the beating of the pulſe. They mention likewiſe, that after this motion ceaſed to be felt, there was perceived another, which they compare to that felt in a boat on a river, the current of which is very ſlow. Thoſe only, who lay on the ground, were ſenſible of this motion; for ſuch, as were ſitting on chairs, or ſtanding, perceived nothing of it.

This is the whole, Sir, of what I have learned on this ſubject. I leave you to judge, whether it be worth communicating to the Royal Society; whom I requeſt you to aſſure of my moſt profound reſpect, and of my deſire to merit the honour done me of admitting me into their body.

I am with the greateſt regard,

Sir,

Your moſt humble

and moſt obedient ſervant,

A. Trembley.

CXVI. *An*

CXVI. *An Account of a Treatiſe, in* Latin, *preſented and dedicated to the* Royal Society, *intituled,* "Gottlob Caroli Springsfeld, "M. D. &c. &c. commentatio de pre-"rogativa Thermarum Carolinarum in "diſſolvendo calculo veſicæ præ aqua cal-"cis vivæ," *by* William Watſon, *Member of the Royal Academy of Phyſicians at* Madrid, *and F. R. S.*

Read Dec. 23, 1756. DR. Springsfeld's Treatiſe, which he lately communicated to the Royal Society, contains a ſeries of experiments and obſervations upon the Carlſbad waters in Bohemia, as a ſolvent for the ſtone in the bladder; from whence it appears, that theſe waters have that property in a much higher degree than even lime-water. The Carlſbad waters have been long celebrated for their excellent effects in removing, or at leaſt relieving, many of the diſorders to which mankind is ſubject. How high they ſtood in the opinion of the great Hoffman almoſt every part of his writings bears teſtimony; and if to their other before-known properties they ſhould prove a ſafe, eaſy, and effectual ſolvent for the ſtone in the kidneys and bladder, it certainly would greatly enhance their value.

Our author has very attentively conſidered the writings of Doctors Jurin, Hales, Hartley, Whytt, and others, concerning ſolvents for the ſtone. He has adminiſtred to ſeveral patients, with little or no

ſucceſs, the late Mrs. Stephens's medicine, with the ſtricteſt obſervance of all the cautions, ſaid to be neceſſary in courſes of that medicine. And, though he allows every thing to be true that has been laid down by Dr. Whytt and others in relation to oyſter-ſhell lime-water, he does not ſcruple to aſſert, that the Carlſbad waters, which, as will hereafter appear, have great analogy to calcarious waters, are a far more excellent ſolvent for the ſtone in the kidneys and bladder than any lime-water. Of this truth he is ſatisfied by various experiments, ſeveral of which were made by himſelf alone, and others in conjunction with our learned and ingenious brother Dr. Lieberkuhn, whoſe exactneſs as well as fidelity in making experiments of this kind no one will queſtion.

Dr. Springsfeld, in a treatiſe upon the Carlſbad waters, publiſhed by him in the year 1749, has ſhewn by undoubted experiments, that theſe waters partake always of an alcaline principle; for every pint of them, beſides the neutral purging ſalt, contains three grains of alcaline ſalt, and ten grains of calcarious earth; for which reaſon they ferment with every ſpecies of acids. I before mentioned, that theſe waters have great analogy with lime-water; and if they continue in the baths for any conſiderable time, they not only turn milky, like lime-water, but have a pellicle upon them as that water is obſerved to have. They have likewiſe a gently conſtringing taſte; that was it not for their ſaline taſte they could not eaſily be diſtinguiſhed from lime-water.

It muſt here be premiſed, that all hard bodies, viz. pieces of wood, bone, ſtones, earthen veſſels, bits of ſtraw, and ſuch-like, are incruſted over by lying

lying in the Carlſbad waters, and that in a very little time. Theſe bodies in the ſpace of a night will be covered with a tophaceous cruſt, which continually increaſes. But human calculi, though hard in themſelves, are not incruſted thereby; but are rather diſſolved; which is the more remarkable. The ſame effects are obſerved upon pieces of the hardeſt cheeſe, which ſwell in theſe waters, and are changed into a kind of pultice.

In the treatiſe before us our author has given the detail of many experiments, which prove the ſolvent power of theſe waters. I ſhall lay a few of them only before you, from which an opinion both of our author's exactneſs in making them, as well as how far he is juſtified in his concluſions, may be formed. And here I muſt obſerve, which ſhould be a very comfortable conſideration for the inhabitants in theſe parts, that our author has been obliged frequently to ſuſpend his reſearches for want of human calculi, which is a diſeaſe exceedingly rare in Bohemia.

June 20, 1749. A ſtone of a brown colour, which weighed near two ounces and half, was placed in a china baſon near that ſource, which is called Brudel, in ſuch a manner as to be continually covered with the warm water. Upon the next day the external cruſt began to grow ſoft; upon the third, you might make an impreſſion thereupon with your nail as upon cheeſe; upon the fourth and fifth, it was diſſolved to the nucleus; upon the ſixth, the nucleus itſelf was diſſolved, and in the bottom of the baſon there was left a white viſcid maſs, like pultice, or newly ſteeped cheeſe: this was impalpable between

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the fingers. In this time the baſon was incruſted with a very hard tophaceous maſs, of the thickneſs of a quill. Certain calculi, not bigger than peaſe, were diſſolved thoroughly, ſome in one day and the reſt in two.

1750. June 12. A ſtone, weighing more than half an ounce, was placed in the ſame manner as the former, and not a grain of it remained on the fourth day. At this time a clergyman, who was in a courſe of theſe waters for gouty complaints, voided ſix ſtones, which all were diſſolved in the ſame manner.

A nobleman, who was afflicted with bloody urine, from calculi in the kidneys, came to Carlſbad for the relief of his complaints; and brought with him ſome ſmall calculi, which he had voided a few years before. By Dr. Lieberkuhn's advice Dr. Springsfeld divided theſe calculi into four equal parts, each of which weighed ſix grains. One part of theſe was infuſed in the water of the ſource called Brudel; the ſecond, in the New Spring; the third, in that near the mill. In twelve hours the firſt part had loſt five grains; the ſecond, four; and the third, only one grain. The fourth portion was put upon a linen rag, which was ſtretched over the bottom of a funnel. Into this funnel the nobleman was directed to make water every day before dinner, after his having drank his quantity of Carlſbad water. Upon this, theſe calculi, after eight days, had loſt two-thirds of their weight; viz. four grains. It muſt be here remarked, that this nobleman, during the regimen, did void ſeveral ſmall calculi, which he had not done for ſome years. A larger quantity of bloody urine than uſual attended the parting with theſe ſtones; but

but this continued only two or three days, and afterwards went quite off; and this nobleman from that time was relieved from his former complaints, has enjoyed and does yet enjoy the moſt perfect health.

In the year 1754, our author became poſſeſſed of a calculus, which was of a flinty hardneſs, and bore a bright poliſh. It weighed a quarter of an ounce. He conjectured, that a much longer time would be neceſſary to diſſolve this ſtone; but what was very remarkable it diſſolved ſooner than the reſt: for after having been immerſed twenty-four hours, two grains of it only remained undiſſolved. This ſtone was not placed in the china baſon as the others were, but ſuſpended in a little looſe-woven net, that it might more freely be waſhed by the water. Dr. Lieberkuhn was at this time at Carlſbad; he was preſent at this experiment, and was witneſs of its truth. The net uſed in this experiment was covered with a tophaceous cruſt, from being ſteeped in the water.

The next year, when Dr. Lieberkuhn returned to Carlſbad, he brought with him, for experiment-ſake, ſeveral calculi, ſome of which were large ones. He made there many experiments, in which our author aſſiſted. A large ſtone was ſawed into four pieces nearly equal. One of theſe, weighing 99 grains, was put into a little linen bag, and immerſed in the ſource called Brudel: the ſecond, in like manner, which weighed 96 grains, into that called the New Spring: the third, weighing 93 grains, into that near the mill: the fourth was ſet apart for other trials. After four days immerſion they were ſeverally examined. The firſt had loſt 85 grains; the ſecond,

thirty-

thirty-three grains; the third, only 16 grains. That it might be eſtimated in what degree the ſolvent power of the Carlſbad water did exceed that of lime-water, the following experiment was tried. Three pieces of calculi, each exactly thirty grains in weight, were put into ſeparate phials. Upon one was poured ſome freſh egg-ſhell lime-water: upon the ſecond, ſome Carlſbad water: upon the third, ſome of the urine of a perſon daily drinking theſe waters for the recovery of his health. Theſe phials were all placed in one of the canals, which carries off the waſte water from the baths: the degree of heat in this place was by Fahrenheit's thermometer 96, much the ſame as the heat of human blood. The lime-water, the Carlſbad water, and the urine, were changed every day, and the proceſs continued for fourteen days. Upon the fifteenth, the remaining fragments of ſtone were taken out of the phials, and weighed when dried. The piece macerated in lime-water had loſt one grain: that in the Carlſbad water, ſix grains: that in the urine, five grains. According therefore to this experiment the ſolvent power of the Carlſbad water was ſix times, that of the urine five times greater than that of the lime-water.

The ſolvent power of medicated urine is of very great importance, and requires more particular attention; as our greateſt expectations in diſſolving the ſtone in the bladder muſt ariſe from that. It was therefore very fit that our author ſhould inveſtigate, as far as was in his power, the ſolvent property of the urine of thoſe who drank theſe waters. He therefore ſuſpended to the end of a funnel a ſufficiently hard and compact calculus, weighing about an ounce.

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This was contained in a linen rag, ſo that the urine might readily paſs over it; and a perſon, who uſed the Carlſbad waters every morning, after having taken them, conſtantly made water into that funnel; from whence it came to paſs, that on the ſixteenth day the ſtone was half diſſolved, and the remaining part was become ſo porous and friable, that it almoſt fell to pieces. No one can ſuppoſe that the urine of a man perfectly in health would have the ſame ſolvent property; leſt however that ſhould happen, our author ſuſpended a piece of a calculus, weighing two drams, in the ſame manner with the preceeding, and made water upon it himſelf many times a day: but this piece of calculus, after twelve days, was ſo far from being leſſened, that it had increaſed two grains in weight.

Our author, leſt he ſhould be thought to have depended too much upon one ſet of experiments, made others. Among ſeveral calculi, which Dr. Lieberkuhn had communicated to him, there was one exceedingly hard. This he cut into four parts, each weighing exactly eighty grains. Each of theſe was put into a ſeparate phial. Upon the firſt was poured freſh oyſter-ſhell lime-water: upon the ſecond, Carlſbad water: upon the third, the urine of one who drank theſe waters: upon the fourth, the urine of one perfectly in health, and who only drank for his breakfaſt ſome cups of tea. Theſe phials were placed in the ſame manner with thoſe before-mentioned, and their heat kept conſtantly the ſame. Every day theſe calculi had freſh liquid poured upon them after the old was ſeparated. At the end of twenty days theſe ſtones were dried and weighed. The fragment in-

fuſed in oyſter-ſhell lime-water was found to have loſt almoſt three grains: that in Carlſbad water twenty-two grains: that in medicated urine fourteen grains: but that infuſed in the urine of the man in health had increaſed three grains. Theſe experiments therefore leave no room to doubt of, either the ſolvent power of the Carlſbad water itſelf, or that of the urine of thoſe who drink theſe waters.

Our author has a very curious remark in relation to a perſon who laboured under the ſtone, and who drank theſe waters for two months. He daily voided with his urine a large quantity of white viſcid mucus; which, after filtration of the aqueous parts from it, was found to be a white earthy powder, rubbed off as it were from a ſtone. The quantity of this powder ſaved during the ſpace of a month amounted to more than three ounces. If ſome of this powder was put into the urine of one who drank Carlſbad water, it was immediately converted into a pultaceous ſubſtance; but if into that of one, who did not drink this water, it fell quite undiſſolved to the bottom of the veſſel.

Dr. Springsfeld obſerves, that the Carlſbad water has great power in diſſolving the tophaceous cruſt, which frequently covers the teeth. During the courſe of theſe waters, this cruſt moſt generally ſeparates from the teeth, and falls off.

However great the power of theſe waters are in diſſolving the ſtone in the bladder, they have a quite contrary effect upon gall ſtones. So far from diſſolving theſe laſt, our author has frequently found that theſe waters envelope them with their tophaceous cruſt. Our ingenious brother Dr. Whytt has obſerved,

obſerved, that lime-water has no ſolvent power upon gall ſtones. Hence we draw another proof of the analogy of lime-water with Carlſbad water.

If it ſhould be wondered at, how it comes to paſs that the urine of thoſe who drink theſe waters ſhould have the power of diſſolving the ſtone, it is neceſſary to inform our readers, that this urine contains nearly the ſame properties which the water originally had. It has before been obſerved, that theſe waters are impregnated with an alcaline principle, and conſequently ferment with acids. The urine of thoſe who drink them, if made before dinner, has the very ſame quality as our author has frequently experienced; eſpecially if the accuſtomed quantity of water is taken, and nothing elſe is drank upon them. The cuſtomary doſe at Carlſbad is not leſs than ſix, ſeven, or eight pints of water taken every morning: for which reaſon we are not to wonder that the urine has the property of diſſolving the ſtone in the kidneys and bladder, if it is long retained. And our author makes no ſcruple, but that the injection of theſe waters into the bladder would be very powerful in relieving calculous complaints; though this he had never tried; neither was he much induced thereto, as the urine is poſſeſſed of all the powers which he was in ſearch of.

It remains that we juſt take notice, by what means theſe waters are poſſeſſed of their ſolvent power. It is well known, that acids, more eſpecially mineral ones, do diſſolve animal calculi, by acting upon their terreſtrial parts, dividing their maſſes, and becoming neutral thereby. Theſe effects do not ariſe from alcalies, as they leave terreſtrial ſubſtances untouched.

If ſometimes we carefully attend to the operations of nature, we now and then make diſcoveries which muſt otherwiſe have eſcaped us. If we pour nitrous or vitriolic acid upon that ſtoney ſubſtance, which is uſually called crabs-eyes, and let them remain in the glaſs for a conſiderable time perfectly ſtill, we ſhall find at the bottom of the veſſel, after the terreſtrial parts are thoroughly diſſolved, a membranous ſubſtance or jelly, exactly in ſize and figure reſembling the crabs-eyes, and which the acid had left untouched. Exactly ſuch a gelatinous maſs our author has obſerved in ſtones of the bladder, more particularly in ſmall ones, after diſſolving them in acids. If crabs-eyes are infuſed in an alcaline lixivium for a conſiderable time, we ſee no change in them, which can be properly called a ſolution: about them we obſerve a certain viſcid appearance like a cloud; if that is taken away, and the crabs-eyes are dried, and afterwards weighed, they have not only loſt part of their weight, but are become much more friable; which is a great argument that they have loſt ſomething. If afterwards theſe crabs-eyes are waſhed with warm water, to carry off the alcaline matter adhering to them, and afterwards ſet to diſſolve in acids, theſe crabs-eyes, after the ſolution of their terreſtrial parts, leave nothing gelatinous behind them, as they did in the other experiment; from whence it is plain, that the gelatinous ſubſtance had been extracted and diſſolved by the alcaline lixivium. The very ſame thing happens to the human calculus.

It appears therefore more than probable to our author, that lime-water and Carlſbad waters, on account of their alike partaking of the alcaline and calcarious principle,

principle, do diſſolve the before-mentioned animal gluten only, by which the terreſtrial parts are united together; and upon the ſolution of which theſe parts muſt ſeparate and fall aſunder. From hence may be accounted for alſo the origin of that white viſcid matter, which adheres to the bottom of the veſſel like pultice, after the diſſolution of calculi in the Carlſbad waters; and which is nothing more than the terreſtrial parts of the ſtone deprived of the animal gluten, which makes them adhere together. Hence we ſee the reaſon why our predeceſſors adopted two ſorts of lithontriptic remedies, and thoſe of quite oppoſite properties. Baſil Valentine, Paracelſus, Helmont, and others, adminiſtered alcalies: Sylvius, Laurembergius, and Dippelius, acids. By theſe laſt they attempted to diſſolve the terreſtrial parts; by the former, the connecting gluten. But the caſe in gall ſtones is different: their connecting gluten, which unites the bilious parts, is not an animal jelly, as in the *calculus veſicæ*, but a fat inflamable oil, which is neither diſſoluble by the Carlſbad waters nor by lime-water.

Our author conjectures that he has proved demonſtratively, that the ſolvent power of the Carlſbad waters does exceed that of lime-water; beſides which it has this advantage, that it is not in the leaſt nauſeous, and may be continued, if neceſſary, for ſix or eight months, without any other inconvenience than that of drinking them upon the ſpot; which may indeed oblige perſons whoſe dwellings are remote from Carlſbad to take a journey thither; whereas lime-water may be drank at home.

I have been the more copious in my account of the work before us, as the ſubject of it is very intereſting; one, in which ſome of our brethren have remarkably diſtinguiſhed themſelves, which occaſioned Dr. Springsfeld to dedicate his performance to this learned Society. The experiments in his work, of which there are many, are well deviſed, and to appearance carefully executed. He has not attempted to amuſe us with vain and fruitleſs ſpeculations; but, on the contrary, has nobly turned his thoughts towards obviating the diſtreſſes, and relieving the miſeries, to which human life is unhappily ſubject.

W. Watſon.

END of VOL. XLIX.

INDEX

AN

INDEX

TO THE

FORTY-NINTH VOLUME

OF THE

Philoſophical Tranſactions.

A.

ABDOMEN, Account of the Succeſs of ſome Experiments of injecting Claret, *&c.* thereinto after Tapping —— —— *Page* 485
Acorus, True, Account of that Plant —— 827
Actions of Jupiter and Saturn, the Irregularities of the annual Motion of the Earth occaſioned by them — 737
Action of the Sun, Force thereof on the Equatorial Parts of the Earth —— —— 704
—— on the mean Preceſſion of the Equinoxes 709
Action of unſlacked Lime, on volatile alcaline Salt — 222
Adder's Tongue, Account of that Plant —— 853
Adee, Swithin, M. D. two Letters from him concerning the Agitation of the Waters on the 1ſt of *Nov.* 1755, at *Guildford*, in *Surry* —— —— 357
Adrianople, Account of a violent Earthquake there 116
Adriatic Sea, Eſſay towards a natural Hiſtory thereof 585
Aetna, an Account of a late Eruption thereof — 209
Affleck (Capt.) his Account of the Agitation of the Sea at *Antigua* on the 1ſt of *Nov.* 1755 —— 668

Agaric

INDEX.

Agaric of the Oak, Account of that Species of Plant from which the Styptic, ſo called, is prepared —— 28
———— Effects thereof, after ſome of the moſt capital Operations in Surgery — 36, 93, 264
Agitation of the Waters, at *Antigua*, on the 1ſt of *Nov.* 1755 ——— ——— 668
———— at *Chevening*, in *Kent* —— 360
———— at *Cranbrook*, in *Kent* — *ibid.*
———— in *Cumberland* — — 381
———— at *Dartmouth* — — 643
———— in *Devonſhire* and *Cornwall* — 371
———— near *Durham* ——— 385
———— in the *Frith of Forth* in *Scotland* — 550
———— at the *Hague*, in *Holland* — 396
———— at *Hamburgh* ——— 550
———— at *Hunſton*, in *Norfolk* — 380
———— at *Kingſale*, in *Ireland* — 391, 393
———— at *Leyden* —— —— 397
———— at *Loch Lommond*, in *Scotland* — 389
———— at *Loch Neſs*, in *Scotland* —— 387
———— in *Peerleſs Pool*, in *Old-ſtreet* — 362
———— at *Portſmouth* —— 351
———— near *Reading*, in *Berkſhire* — 365, 367
———— at *Rochford*, in *Eſſex* — 364
———— at *Shirburn Caſtle*, in *Oxfordſhire* — 368
———— in *Suſſex*, and the Southern Parts of *Surry* 353
———— at *Swanzey* —— — 379
———— in the *Thames*, near *Rotherhithe* — 361
———— at *Yarmouth* ——— 380
———— in ſeveral Ponds in *Hertfordſhire* — 684
———— at *Ildfarcombe*, in *Devonſhire* — 642
———— in the Lake *Ontario*, in *North America* 544
Air, freſh, the Benefit of blowing Showers thereof up through diſtilling Liquors ——— 312
———— Thoughts on the above new Method of Diſtillation ——— —— 534
Alcaline volatile Salt, the Effects of unſlacked Lime thereon —— ——— 222

Alder,

Alder, the Blackberry-bearing, Account of that Plant 819
Aleppo, an Account of four undeſcribed Fiſhes found near that Place — — — 445
Aleppo, its Latitude — — 252
Allemand (Monſ.) his Account of the Agitation of the Water at *Leyden* on the 1ſt of *Nov.* 1755 — 397
——— —— his Letter concerning an Earthquake felt in *Holland* — —— — 545
——— —— his Letter concerning the late Earthquakes at *Maeſtricht* —— —— — 663
——— —— his Account of an Earthquake felt in divers Places of the *Netherlands*, on the 26th and 27th of *Nov.* 1755 — — — 512
American Waſps Neſt, ſome Obſervations thereon 205
Amersfort (in the Province of *Utrecht*), Account of an Earthquake felt there on the 15th of *Jan.* 1756 513
Amnii Liquor contributes to nouriſh the Fœtus which ſwims therein — — — — 254
Amputations, Account of the Succeſs of *Agaric* and *Fungus Vinoſus* in the Healing of them — 93, 264
——— Dº of the Powder of *Lycoperdon* — 38
——— the Uſe of the Powder of *Lycoperdon* in ſtopping the Blood after them — — 40
Amſterdam, Account of an Earthquake felt there 545
Anacardium, Varniſh produced therefrom — 872
Animalcules, Microſcopical, produced from infuſing of dried Millepedes and Cantharides in boiling Water 553
Animals, Account of Experiments on the Senſibility and Irritability of the ſeveral Parts of them — 240
——— Account of Worms found in their Bodies 246
Annual Motion of the Earth, Eſſay concerning the Irregularities thereof —— —— 737
Annuities on ſingle Lives, Table of their Values — 892
Anſon (Lord), Account of the Irregularities of the Tides in the *Thames* and *Medway*, communicated by him 523
Antigua, Account of the Agitation of the Sea there on the 1ſt of *Nov.* 1755 — — 668

INDEX.

Antigua, Account of the Impreſſion upon a Stone dug up there — — — 295
——— Mr. *Arthur Pond* his Deſcription thereof — 297
——— Account of the Quantity of Rain fallen there for Four Years — — — 295
Antioch, its Latitude — — — 252
Antiquities diſcovered at *Herculaneum* 109, 110, 112, 490
Antiſles of America, Obſervations on the Currents of the Sea there — — — 624
Antonio (Father, a Writer at the *Vatican*), his Artifice for unrolling the Manuſcripts, which were dug out of the Ruins of an Edifice near *Herculaneum* — 113
Apogee of the Moon, the Inequalities produced by its Poſition in the Preceſſion of the Equinoxes, and in the Obliquity of the Ecliptic — — 722
Arderon (Mr. *Wm.*) Letter from him concerning the Agitation of the Water at *Hunſton* and *Yarmouth*, in *Norfolk*, on the 1ſt of *Nov.* 1755 — 380
Arm, *Paralytic*, Cure thereof by Electricity — 558
Arteries, ſome remarkable Experiments made upon them with the Powder of *Lycoperdon* — — 36, 93, 264
Arzila, Account of the Earthquake there on the 1ſt of *Nov.* 1755 — — — 429
Aſa Fætida, how produced — — 253
Aſcanius (*Peter*, M. D.) his Letter concerning a Mountain of Iron Ore in *Sweden* — — 30
Aſcent of Vapours, concerning the Cauſe thereof — 124
Aſia, Account of ſome new Aſtronomical and Phyſical Obſervations made there — — 251
Aſtronomical Obſervations made in *Aſia*, a ſhort Account of them — — — 251
——— ——— Advantages of taking the Mean of a Number of them — — — 82
Axis of the Earth, its Nutation — — 704

B.

Bagdad, its Latitude — — — 252
Baily (Mr. *Wm.*) his Method of encreaſing the Force of the Fire-Engine — — — 312

Baker

Baker (Mr. *Henry*) Letter to him concerning the Agitation of the Waters on the 1ſt of *Nov.* 1755 — 380
——— ——— Account of the Books and antient Writings dug out of the Ruins of an Edifice near *Herculaneum*, communicated by him — 112
——— ——— Obſervations on the Earthquake at *Liſbon* on the 1ſt of *Nov.* 1755, communicated by him 413
——— ——— an Account of ſome *Fungitæ*, and other curious coralloid foſſile Bodies, communicated by him 513
——— ——— his Supplement to an Account of a diſtempered Skin, publiſhed in N° 424 of theſe Tranſactions — — — 21
——— ——— Account of the Tumbling down of vaſt Heaps of Snow from the Mountains — 796
Barbary, an Account of the Earthqakes that happened in that Country on the 1ſt and 18th of *Nov.* 1755 428, 434
Barber (Mr. *Thomas*) Letter from him concerning the Agitation of the Waters at *Yarmouth* on the 1ſt of *Nov.* 1755 — — — 380
Barboſa (Dr. *John*) his Obſervations on the Eclipſe of the Moon — — — 265
Barker (*Tho.* Eſq;) his Letter concerning the Return of the Comet in 1757 or 1758 — — 347
Barometer, the general Appearances thereof accounted for 139, 145
——— concerning the Cauſe of the Phænomena thereof 124
Barren Strawberry, Account of that Plant — 834
Barrington (the Hon. Mr.) his Communication of a Letter concerning the Iſland of *Manilla* — 458
Baſe Rocket, Account of that Plant — 833
Baſtard Hellebore, Account of that Plant — 851
Baſtard Parſley, *purple flowered*, Account of that Plant 821
Baſtard-ſtone Parſley, D° — — 822
Bath, in *England*, an Attempt to explain two *Roman* Inſcriptions which were dug up there — 285
Baths (at *Toplitz*, in *Bohemia*) Effects of the Earthquake, of the 1ſt of *Nov.* 1755, on them — 395

Bazil, Wild, Account of that Plant — 838
Bazin (Monſ.) Letter to him concerning the Earthquake at *Oporto*, 1 *Nov.* 1755 — — 422
Belchier (Governor) his Lady, her Letter concerning an extraordinary Motion of the Water in the Lake *Ontario* 544
Bell-flowers, Riged-leaved, Account of that Plant 815
Benefit of blowing Showers of freſh Air up thro' diſtilled Liquors — — — 312
Bergemoletto, Account of ſome Houſes there, which were intirely overwhelmed by Snow — 796
Berkſhire, Account of the Agitation of the Waters at *Reading*, in that County, 1 *Nov.* 1755 — 365, 367
Betony, True Paul's, Account of that Plant — 807
Bewick (Mr. *Benjamin*) his Account of the Earthquake at *Cadiz* on the 1ſt of *Nov.* 1755 — 424
Bezom, or *Lowdutch Heath*, Account of that Plant 829
Bilberries, Account of that Plant — 829
Bills of Mortality, Objections to them anſwered — 888
Birch (Thomas) D. D. his Account of the Agitation of the Waters in *Peerleſs Pool*, in *Old-ſtreet*, on the 1ſt of *Nov.* 1755 — — — 362
—— —— an Account of the Agitation of the Water at the *Hague* on the 1ſt of *Nov.* 1755, communicated by him — — — 396
—— —— Letter to him concerning the Agitation of the Waters in *Scotland* and at *Hamburgh* — 550
—— —— Letter to him concerning the Earthquakes felt at *Bruſſels* — — — 546
—— —— an Account of the Earthquakes of the 1ſt and 9th of *Nov.* 1755, as felt at *Neufchattel*, in *Swiſſerland*, communicated by him — 436
—— —— an Account of Inoculation, given by Sir *Hans Sloane*, Bart. to Mr. *Ranby*, communicated by him 516
—— —— Letters to him concerning the ſurpriſing Agitation of the Waters on the 1ſt of *Nov.* 1755 351, 353, 361, 364

Birch (Thomas) D. D. Letter to him concerning ſome remarkable Polypes found in the Waters near *Bruſſels*, in *Flanders* — — — 248
—— —— Letter to him concerning the Senſibility and Irratibility of the ſeveral Parts of Animals — 240
—— —— Letter to him concerning the Toxicodendron of *Carolina* — — 161
—— —— Letter to him containing an Account of Worms found in Animal Bodies — 246
—— —— Letter to him concerning an Earthquake felt at *Colen*, *Leige*, *Maſtricht*, &c. — 893
—— —— his Tranſlation of an Account of an Eſſay towards a Natural Hiſtory of the *Adriatic* Sea — 585
—— —— Letter to him containing a Diſſertation on a *Parthian* Coin — — 593
—— —— Letter to him containing Remarks on the Stones in *Naſſau*, *Treves*, and *Colen*, reſembling the Giants Cauſey — — — 581
Biſtort, the Greater, Account of that Plant — 830
Bizerty, in *Barbary*, extraordinary Currents on that Coaſt 635
Bladder, Stone therein diſſolvable by the *Carlſbad* Waters in *Bohemia* — — — 895
—— —— D° by medicated Urine --- 900
Blackberry-bearing Alder, Account of that Plant — 819
Blair (John) L. L. D. his Account of the Agitation of the Waters at *Reading*, in *Berkſhire*, on the 1ſt of *Nov.* 1755 — — — 367
—— —— Letter communicated by him concerning the Agitation of the Waters at *Swanzey* on the 1ſt of *Nov.* 1755 — — — — 379
Bloodwort, Account of that Plant — 827
Bloody Dock, D° — — 827
Bodies of Animals, Account of Worms found in them 246
Boiling Water, Obſervations on the Productions of Animalcules from Infuſions therein — — 553
Books and ancient Writings dug out of the Ruins of an Edifice near *Herculaneum* — — 112

Bonne (called alſo *Hipone*), in *Barbary*, extraordinary Currents there — — — 638
Bonnet (Monſ.) Letter from him concerning the Earthquakes at *Valais*, in *Swiſſerland* — 511
Borlaſe (Wm.) A. M. his Letter concerning the Agitation of the Waters in *Cornwall* on the 1ſt of *Nov.* 1755 373
Boſton, in *New England*, Account of an Earthquake felt there on the 18th of *Nov.* 1755 — 439
Bowyer (John Windham) Eſq; an Account of the Sinking of a River at *Pontypool*, in *Monmouthſhire*, communicated by him — — — 547
——— ——— Letter to him concerning the Earthquakes along the Coaſt of *England* from *Dover* to *Margate* — — — 579
Boy, an Account of a remarkable Caſe of one, who had a conſiderable Part of his Inteſtines forced out by the Fall of a Cart — — — 238
Brackenridge (Wm.) D. D. his Letter concerning the Method of conſtructing a Table for the Probability of Lives at *London* — — — 167
——— ——— a Table of the Values of Annuities according thereto — — — 892
——— ——— his Letter concerning the Number of People in *England* — — 268
——— ——— his Letter concerning the preſent Increaſe of the People in *Britain* and *Ireland* — 877
Bradley (James) D. D. Two Eſſays relating to Aſtronomy addreſſed to him — — — 700
——— ——— Letter to him concerning the Return of the Comet expected in 1757 or 1758 — 347
Brady (T.) M. D. his Account of the Earthquakes felt at *Bruſſels* — — — 546
——— ——— his Account of ſome remarkable Inſects, of the Polype Kind, found in the Waters near *Bruſſels*, in *Flanders* — — — 248
Brander (Guſtavus) Eſq; his Account of a remarkable Echinus — — — 295

Brander

INDEX.

Brander (Guſtavus) Eſq; his Account of the Effects of Lightening at the *Daniſh* Church in *Wellcloſe-ſquare* 298
Breezes, Land and Sea, how occaſioned — 146
Brigue, in *Valais*, an Account of a continued Succeſſion of Earthquakes there — — 616
Brimſtone-Hill (in the Iſland of *Guadelupa)* Obſervations made upon it — — — 564
Brockleſby (Richard) M. D. Account of the Agitation of the Water at *Kinſale*, in *Ireland*, on the 1ſt of *Nov.* 1755, communicated by him — — 393
——— ——— his Account of the Senſibility and Irritability of the ſeveral Parts of Animals — 240
Brook Lime, Account of that Plant — 807
Broom Rape, Dº — — 838
Brownrigg (Wm.) M. A. his Thoughts on Dr. *Hales*'s new Method of Diſtillation by the united Force of Air and Fire — — — — 534
Bruni (Dr. *Joſ.*) an Account received from him of ſome Houſes which were intirely overwhelmed with Snow 796
Bruſſels, in *Flanders*, Account of the Earthquake felt there 546
——— Account of ſome remarkable Inſects, of the Polype Kind, found in the Waters near it — 248
Bullock (Rev. Mr.) his Account of the Earthquake, *Nov.* 1, 1755, as felt in the Lead Mines in *Derbyſhire* 398
Burnett Roſe, Account of that Plant — 834
Burnet Saxifrage, Great, Dº — — 824
Burnet, Small, Dº — — — 852
Buſhey Hawkweed, Narrow-leaved, Dº — 846
Butter Burr, Dº — — — 848
Butter Fly Orches, Dº — — — 850
—— — *Satyrion*, Dº — — — — 849
Byam (Rev. Mr. *Francis*) his Account of an Impreſſion of a Stone dug up at *Antigua*; and of the Quantity of Rain fallen there for Four Years — — 295

C.

Cadiz, Account of the Earthquake there on the 1ſt of *Nov.* 1755 — — — 424, 427

Calamint,

INDEX.

Calamint, Field, Account of that Plant — 838
Cancer, of the Eyelids, Noſe, and neighbouring Parts, Method of curing the ſame — — — 186
Canterbury Bells, Account of that Plant — 817
Cantharides, Obſervations of the Productions of Animalcules by an Infuſion of them in boiling Water — 555
Canton (John) M. A. Letter to him, containing an Account of the State of the Thermometer on the 8th and 9th of *February* 1755 — — — 43
Carolina, a Plant called Toxicodendron, of common Growth there, the ſame with that from whence the *Japan* Varniſh is produced — — 162
Carlſbad, in *Bohemia*, Account of the Waters there 895
Caſe of a Boy who had a conſiderable Part of his Inteſtines forced out by the Fall of a Cart — — 238
—— of a Child, an extraordinary one — 34
Caſes of Dropſies cured by Sweet Oil — — 46
Caſe of a morbid Eye, a remarkable one — 18
Caſhew Nut-tree, Varniſh produced therefrom — 872
Caſſus, Mount, its Latitude — — 252
Caſtro (Dr. *De*) Part of Two Letters to him concerning the Earthquake at *Liſbon* on *Nov.* 1, 1755 — 409
Caſtro Sarmento (Jacob De) M. D. an Obſervation of an Eclipſe of the Moon communicated by him — 265
Cat-mint, Account of that Plant — — 837
Catalogue of Fifty Plants, from *Chelſea* Garden, for the Year 1754, preſented to the *Royal Society* by Dr. *John Wilmer* — — — — 78
——— —— —— —— D° for the Year 1755 — 607
Cat (Monſ. *Le*) M. D. his Account of thoſe malignant Fevers that raged at *Rouen* in the Years 1753 and 1754 - 49
Cauſe of Exhalations, Winds, &c. Letters concerning it 124
Caylus (Count) an ancient Method of Painting revived by him — — — — 652
Cerati (Monſ.) Letter to him concerning the Books and ancient Writings dug out of the Ruins of an Edifice near *Herculaneum* — — — 112

Chambers

Chambers (Mr. *Charles*) his Account of the Earthquake at *Madeira* the 1ſt of *Nov.* 1755 — — 435
Charr Fiſh, ſome Account thereof — — 210
Chatham, Account of the Irregularity of the Tides there, in *Feb.* 1756 — — — 523
Chelſea Garden, Catalogue of Fifty Plants therefrom 78, 607
Chemical Experiments concerning the Action of unſlacked Lime on voatile alcaline Salts — — 222
Cheſter (Biſhop) Letter to him concerning the Agitation of the Waters in *Cumberland* — — 381
Chevalier (John) his Obſervations, made at *Liſbon*, on the Eclipſes of the Satellites of *Jupiter* — — 48
Chevening, in *Kent*, Account of the Agitation of the Water there *Nov.* 1, 1755 — — 360
Chickling Vetch, Account of that Plant — 843
Chickweed, Long-leaved, D° — — 832
Child (Mr. *Wm.*) his Letter to Mr. *James Pitford*, concerning the Effects of Lightning at *Darking*, in *Surry* 309
Child, an extraordinary Caſe of one — — 34
Cinquefoil, Tormentil, Account of that Plant — 835
Claret, an Account of the Succeſs of ſome Experiments of injecting it into the Abdomen after Tapping — 485
Climing Fumitory, Account of that Plant — 841
Cockſhead, D° — — — 843
Coic, near *Aleppo*, an Account of Fiſhes found in that River — — — — 447
Coin, Parthian, a Diſſertation on one — 593
Colares (about 20 Miles from *Liſbon*) Obſervations made there of the Earthquake *Nov.* 1, 1755 — 413
Colen, Account of an Earthquake felt there — 893
—— Remarks on Stones in that Territory, reſembling thoſe of the Giants Cauſey — — 581
Colden (Cadwaladar) Eſq; Letter from him concerning the Earthquake felt at *New York* the 18th of *Nov.* 1755 — — — — 443

Collinſon (Mr. *Peter*) Account of Copper-ſprings lately diſcovered in *Penſylvania*, communicated by him — 648
——— ——— Letter to him concerning a curious fleſhy Coral-like Subſtance — — — 449
——— ——— Letter to him concerning the Earthquake felt in *New York*, *Nov.* 18, 1755 — 443
——— ——— Letter to him concerning the Earthquake felt in *Penſilvania*, *Nov.* 18, 1755 — 444
——— ——— Letter to him concerning Four undeſcribed Fiſhes of *Aleppo* — — 445
——— ——— Letter concerning the Effects of Lightning at *Darking*, in *Surry* — — 309
——— ——— Letter to him concerning ſome Microſcopical Obſervations — — 553
——— ——— Letter to him concerning a Mountain of Iron Ore in *Sweden* — — 30
——— ——— Letter to him concerning the Charr-fiſh 210
Colquhoun (Sir *James*) his Account of the Agitation of the Water at *Loch Lommond*, *Nov.* 1, 1755 — 389
Columbines, Account of that Plant — — 836
Comet, Extract of a Letter concerning the Return of one in the Year 1757 or 1758 — — 347
Commiſſioners of the Exciſe, Letter to them concerning the Earthquakes along the Coaſt of *England* from *Dover* to *Margate* — — — — 579
——— ——— Letter to them concerning the Sinking of a River at *Pontypool* — — 547
Common Salt, Method of making it ſooner, cheaper, and better — — — 330
Condamine (Monſ. *La*) his Letter to Dr. *Matty* — 622
Configurations of the ſmalleſt ſhining Particles of Snow, Method of obſerving them — — — 644
Conſiderations on Two large Pieces of Lead, with *Roman* Inſcriptions — — — 686
Conſtantinople, Account of ſeveral Earthquakes lately felt there — — — — 115
——— Queries concerning it, and their Anſwers 96

Copper-

Copper-ſprings lately diſcovered in *Penſylvania* — 648
Coral-like Subſtance, an Account of a curious fleſhy one 449
Coralline Moſs, *Small*, *brown*, Account of that Plant 858
Coralloid foſſile Bodies, Account of ſome curious ones 513
Codded-Corn Violet, Account of that Plant — 817
Cornwall, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — 371
Coſta (Mr. *Emanuel Mendes De*) his Tranſlation, from the *Latin*, of a Letter concerning a Mountain of Iron Ore in *Sweden* — — — — 30
Cotton Graſs, Account of that Plant — 809
Cough, a ſhort dry one, called the Huſk, incident to young Bullocks, cauſed by Worms — — 247
Cowper (Earl) Letter to him concerning the Agitation of the Waters near *Durham*, *Nov.* 1, 1755 — 385
Cramon (Mr.) his Account of the Benefit of Ventilators on board a Ship with 392 Slaves — — 335
Cranbrook, in *Kent*, Account of the Agitation of the Waters there, *Nov.* 1, 1755 — — 360
Craneſbill, *Dovesfoot*, Account of that Plant — 841
—— —— with jagged Leaves, D° — — 840
—— —— *Shining* or *Stone*, D° — *ibid.*
Creeping Tormentil, D° — — 835
Crocodile, an Account of a particular Species thereof 639
Croſswort, Account of that Plant — 853
Crowfoot, *Muſkwood*, D° — — — 831
Cruſius (*Lewis*) D. D. Letter to him concerning the Agitation of the Waters near *Reading*, in *Berkſhire*, *Nov.* 1, 1755 — — — 365
—— —— Letter to him concerning the Earthquake, as felt in the Lead Mines in *Derbyſhire* — 398
—— —— an Account of the Earthquake at *Madeira*, *Nov.* 1, 1755, communicated by him — 435
Cuckow Flower, Account of that Plant — 839
—— —— *Hairy*, D° —— 840
Cumberland, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — 381

Cuneo (the Intendant of that Province) the Account taken by him of ſome Houſes which were overwhelmed 796
Currents of the Sea, Obſervations on thoſe near the Antiſles of *America* — — — — 624
——— — — — Obſervations on thoſe in the *Mediterranean* — — — 634
Cyperus Graſs, Account of that Plant — 808

D.

Daffodil, Wild Engliſh, Account of that Plant — 826
Daniſh Church, in *Wellcloſe-ſquare*, an Account of the Effects of Lightning there — — 298
Darking, in *Surry*, Effects of Lightning there — 309
Dartmouth, Account of the Agitation of the Waters there 643
Daval (Peter) Eſq; Account of the Earthquake at *Liſbon*, *Nov.* 1, 1755, communicated by him — 411
Daviel (Monſ.) his Diſſertation upon the Cancer of the Eyelids, Noſe, and neighbouring Parts, commonly called *Noli me tangere* — — — 186
Deadly Night Shade, Account of that Plant — 818
Deafneſs, when cauſed by an Obſtruction in the *Tuba Euſtachiana*, its Cure — — 213
Delibard (Monſ.) Letter from Mr. *Benj. Franklin* to him, concerning Electricity — — 305
Deluge, Univerſal, Reaſons for the Belief of it — 678
Deptford, Account of the Irregularity of the Tides there in *Feb.* 1756 ——— ——— 523
Derbyſhire, Account of the Earthquake *Nov.* 1, 1755, as felt in the Lead Mines there — — 398
Devonſhire, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — 371, 642
Diarbekir, Obſervations made there — 252
Dingley (Robert) Eſq; Letter to him concerning the Succeſs of the Agaric in Amputation — 264
——— ——— his Account of the Irregularities of the Tides in the River *Thames*, on the 12 and 13 of *Feb.* 1756 ——— ——— 530, 533

Diſeaſes

Diſeaſes of Bullocks and Sheep cauſed by Worms — 247
Diſſenters from the eſtabliſhed Church, Number of them, in proportion to the whole Number of Inhabitants in *London* — — — 179
Diſtillation, Thoughts on Dr. *Hales*'s new Method thereof, by the united Force of Air and Fire — 534
Diſtilled Liquors, the great Benefit of blowing Showers of freſh Air up through them — — 312
Dodder, Account of that Plant —— 813
Dodſon (James) his Table of the Values of Annuities on Lives — — — 892
Donati Vitaliano, M. D. an Account of his Eſſay towards a natural Hiſtory of the *Adriatic* Sea — 585
——— ——— his Letter concerning the Earthquake at *Turin*, and other Parts of *Italy* —— 612
Dover, Account of the Earthquake felt there on the 18th of *Feb.* 1756 —— —— 579
Doveſfoot Craneſbill, Account of that Plant — 841
——— with jagged Leaves, D° —— 840
——— *Shining* or *Stone*, D° — — *ibid.*
Dropſy, Account of the Cure thereof by Sweet Oil — 46
——— a Species thereof incident to Bullocks and Sheep, cauſed by Worms —— —— 247
Dublin, a Journal of the Weather —— 759
Dumbarton, Account of an Earthquake there on the 30th and 31ſt of *Dec.* 1755 —— — 509
Dumfries, Account of the Agitation of the Water in a ſmall Lake at *Cloſeburn*, in that Shire —— 521
Durham, Account of the Agitation of the Waters, near that City, *Nov.* 1, 1755 —— 385
Duſt, a Shower thereof, Account of one falling on a Ship between *Shetland* and *Iceland* —— 509
Dying, the Uſe of Toxicodendron therein — 159

E.

Earth, the Irregularities in the annual Motion thereof, how far occaſioned by the Action of the Sun — 737
Earth, the Nutation of its Axis, Eſſay concerning it 704

Earth-

Earthquake of Nov. 1, 1745, its Effects in *Barbary* 428
——— ——— at *Cadiz* — 424, 427
——— ——— at *Colares*, about 20 Miles from *Liſbon* — — — 413
——— ——— in the Lead Mines in *Derbyſhire* — — — 398
——— ——— at *Liſbon* — 402, 409, 411
Earthquake, *Paulus Jovius* his Account of one like thereto at *Liſbon* in the Year 1531 — 402
Earthquake of Nov. 1, 1755, its Effects at *Madeira* 432, 435
——— ——— at *Madrid* — 423
——— ——— at *Oporto* 418, 419, 421, 422
——— ——— at *Amersfort*, in the Province of *Utretcht* — — — 513
Earthquake, its Effects in *Barbary* — 428
——— ——— at *Boſton*, in *New England* 439
——— ——— at *Brigue*, in *Valais* — 616
——— ——— at *Bruſſels* — 546
——— ——— on the Coaſt of *England*, between *Margate* and *Dover* — — 579
——— ——— at *Geneva* — 438
——— ——— at *Glaſgow* and *Dumbarton* 509
——— ——— in *Holland* — 544, 545, 663
——— ——— at *Manilla* — 459
——— ——— in divers Parts of the *Netherlands* 512
——— ——— at *Neufchattel*, in *Swiſſerland* 436
——— ——— at *New York* — 443
——— ——— in *Penſylvania* — 444
——— ——— at *Turin*, and other Parts of *Italy* 612
——— ——— at *Valais*, in *Swiſſerland* — 511
Earthquakes, Account of ſeveral lately felt at *Conſtantinople*, *Adrianople*, and *Smyrna* —— 115, 116, 117
Eaſtern Countries, Queries concerning them, and their Anſwers — — 96 *to* 107

INDEX.

Eaſtern Countries, ſome Phyſical and Aſtronomical Obſervations made there — — — 251

Echinus, a petrified one of a ſingular Kind — 155

——— Account of a remarkable one — 295

Eclipſes, Obſervations of thoſe of *Jupiter*'s Satellites 48

Eclipſe of the Moon, Obſervations on one — 265

Ecliptic, *its Obliquity*, the Variations occaſioned therein by the Poſition of the Moon's Apogee — 722

——— — ——— the Variations occaſioned therein by the Actions of *Jupiter* and *Saturn* — 744

——— — ——— the Variations occaſioned therein by the Force of the Sun — — 718

Eddiſtone Lighthouſe, Account of the Caſe of a Man who died by the Effects of the Fire there — 477

Edwards (Mr. *George*) his Account of the Species of the Crocodile, called *Lacerto ventre marſupii donato*, &c. 639

Eeles (*Hen.*) Eſq; his Letters concerning the Cauſe of Exhalations, Winds, *&c.* — — 124

Electrical Fluid, attending the Aſcent and Deſcent of the Vapours and Exhalations, and ſuppoſed to be the principal Cauſe of Winds — — 133

——— ——— ſuppoſed to be the Cauſe of the Aſcent of Vapours — — — 132

Electrical Power of the Clouds, the Occaſion of the Death of *George William Richman*, Member of the Imperial Academy of Sciences at *Peterſburgh* — 61

Electricity, Experiments thereof ſucceed better in the *Eaſtern* Countries than in *Europe* — 254

Electrical Experiments made by Mr. *Benj. Franklin* 300

Electricity, a Letter concerning it by D° — 305

——— Account of a Cure of a paralytic Arm thereby 558

Ellicot (Mr. *John*) Account of the Effects of the Earthquake, *Nov.* 1, 1755, at *Madrid*, communicated by him — — — — 423

——— Account of the Effects of the Earthquake, *Nov.* —

Nov. 1, 1755, at *Oporto*, communicated by him 418, 419, 421
Ellis (Mr. *John*) his Account of a curious fleſhy Coral-like Subſtance — — — 449
—— ——— his Letter concerning the Tree that yields Varniſh — — — 866
Ellis (Capt. *Hen.*) his Account of the Benefit of Ventilators on board a Ship with 340 Negroes — 336
Engine for raiſing Water by Steam, its Force encreaſed 312
England, Number of Houſes therein, in 1710 — 270
——— D° — — in 1750 — 887
——— a Letter concerning the Number of People inhabiting therein — — 268, 274
——— Quantity of Wheat conſumed therein — 273
Engliſh Plants Account of ſome of the more uncommon, obſerved in *Leiceſterſhire* — — 803
Engliſh Daffodil, Wild, Account of that Plant — 826
——— *Marſh Saxifrage*, D° — — 833
——— *Soft* or *Gentle Thiſtle*, D° — 847
Equatorial Parts of the Earth, the Force of the Sun's Action on them — — 704
Equinoxes, their Preceſſion, how far occaſioned by the Action of the Sun — — 709
——— —— ——— Eſſay concerning it — 704
——— —— ——— the Inequality thereof depending on the Poſition of the Moon's Apogee — 722
——— —— ——— the Inequality thereof depending on the Poſition of the Moon's Nodes — 714
Eruption of Mount Ætna, Account of a late one — 209
——— — —— *Veſuvius*, D° — 24, 27, 28
Eſſay on the Irregularities in the annual Motion of the Earth — — — 737
—— on the Preceſſion of the Equinoxes, and the Nutation of the Earth's Axis — — 704
Eſſex, Account of the Agitation of the Waters at *Rochford*, in this County, *Nov.* 1, 1755 — 364
Euſtachiana Tuba, Method of eſtoring the Hearing, when injured by an Obſtruction th rein — 213

Exciſe

Exciſe (Commiſſioners of) Letters to them concerning the Sinking of a River near *Pontypool* — 542
——— Letter to them concerning the Earthquakes along the Coaſt of *England*, between *Dover* and *Margate* — — — 579
Exhalations, Experiments proving them to be electrified 151
——— the Quantity of them augmented by Wind 150
Experiments, the Succeſs of ſome, of injecting Claret into the Abdomen after Tapping — 485
——— of the Senſibility and Irritability of the ſeveral Parts of Animals — — — 240
——— *of Electricity*, ſucceed better in the *Eaſtern* Countries than in *Europe* — — — 254
——— proving that all aſcending Vapours and Exhalations are electrified — — — 151
——— relating to the Fire-Engine — 540
——— *Electrical*, made by Mr. *Benj. Franklin* — 300
——— *Chemical*, concerning the Action of unſlacked Lime on volatile alcaline Salt — — 227
Eyelids, and great Angle of the Eye, Diſſertation concerning the Cancer affecting thoſe Parts, commonly called *Noli me tangere* — — — — 186
Eye, remarkable Caſe of a morbid one — — 18

F.

Farrington (Rev. Mr.) his Letter, giving ſome Account of the Charr-Fiſh, found in *North Wales* — 210
Fauquier (Wm.) Eſq; Letter to him concerning the Impreſſion on a Stone, dug up in the Iſland of *Antigua*; and the Quantity of Rain fallen there for Four Years — 295
Fern-water, Account of that Plant — 854
Fevers, Malignant, an Account of thoſe that raged at *Rouen* in the Years 1753 and 1754 — — 49
Fez, Account of the Earthquake there, on the 1ſt and 18th of *Nov.* 1755 — — 430, 431
Field Calamint, Account of that Plant — 838
Fiery Corruſcations iſſuing from a topical oblong Cloud ſeen at *Conſtantinople* — — — 119

Fine-leaved Heath, Account of that Plant — 829
Fire-Engine, Experiments relating to leſſening the Expences of conſtructing and working it — — 540
——— the Force thereof increaſed — 312
Fiſhes, an Account of Four undeſcribed ones of *Aleppo* 445
Fiſſure, Account of one in a Rock, near *Petworth*, in *Surry* — — — — 358
Flanders, remarkable Polypes found in the Waters there 248
Fleabane, Dwarf, Account of that Plant — 848
Fleming (Malcolm) M. A. his Obſervations concerning the Nouriſhment of the Fœtus, by the Liquor *Amnii* 254
Fletcher (Mr.) Letter to him concerning the Agitation of the Water at *Loch Lommond*, *Nov.* 1. 1755 — 389
Fluellin, Account of that Plant — — 807
Fœtus partly nouriſhed by the Liquor *Amnii* — 254
Ford (Mr. *James*) his Account of the Succeſs of Agaric and the Fungus Vinoſus in Amputations — 93
Foſſe (Monſ. *La*) his Experiments upon the Arteries of Horſes, with the Powder of the *Lycoperdon* — 36, 40
Foſſile Bodies, Account of ſome curious ones — 513, 670
——— ——— not to be found in very high Mountains 674
——— ——— thoſe found in *Europe* originally belong to the Equator or Tropics — — 677
Fowke (General, Governor of *Gibraltar*) his Account of Earquakes that happened in *Barbary*, on the 1ſt and 18th of *Nov.* 1755 — — — 428, 431
Fox (the Right Hon. *Henry*) Eſq; Letter to him concerning the Earthquakes that happened in *Barbary*, on the 1ſt and 18th of *Nov.* 1755 — — 430, 431
Framboiſe, Account of that Plant — 834
Franklin (Mr. *Benj.*) Electrical Experiments made by him 300
——— ——— Extract of his Letter to Monſ. *Delibard* concerning Electricity — — 305
Freſh Water, ſome Obſervations on the manner of making it from Sea Water — — — 317

Frith of Forth, in *Scotland*, Account of the Agitation of the Waters there, *Nov.* 1, 1755 — 550
Frooyd (a River ſo-called) Account of the Sinking thereof 547
Fumitory, Climbing, Account of that Plant — 841
Fungitæ, an Account of them, and other curious coralloid foſſile Bodies — — — — 513
Fungus Vinoſus, what it is — — — — 94
——— ——— Account of the Succeſs thereof in Amputations — — — — 93

G.

Gardner (Robert) his Account of the Agitation of the Waters at *Loch Neſs*, in *Scotland*, *Nov.* 1, 1755 387
Geneva, Account of the Earthquake there, *Nov.* 9, 1755 438
Gentian, Dwarf autumnal, Account of that Plant — 820
Georgians, Practiſers of Inoculation — — 108
Giants Cauſey, Remarks on Stones in *Naſſaw*, *Treves*, and *Colen*, reſembling thoſe thereof — — 581
Gillover, or *Gilloſlower*, Account of that Plant — 814
Glaſgow, Account of an Earthquake there on 30 and 31 of *Dec.* 1755 — — — 509
Golden Dock, Account of that Plant —— 828
Golden Rod, D° —— —— — 848
Golden Saxifrage, D° —— —— 831
Graſs of Parnaſſus, D° —— —— 825
Gray (Charles) Eſq; Account of the Agitation of the Sea at *Antigua*, *Nov.* 1, 1755, communicated by him 668
Graymil, Account of that Plant —— — 814
Great Turnet Saxifrage, D° — —— 824
Great Water-Parſnep, D° —— — 822
Greeks, Query concerning their Learning — 96
——— —— anſwered —— —— 106
Gromil, Account of that Plant —— — 814
Gromwell, D° —— —— *ibid.*
Groveſtins (Monſ.) his Account of an Earthquake felt at the *Hague* — — — — 544

Guadelupa, Obſervations made on the Brimſtone Hill in that Iſland — — — — — 564
Guildford, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — 357
Gum Succery, Dwarf, Account of that Plant — 845
Guy (Mr. *Rich.*) his Account of an extraordinary Caſe of a Child — — — 34

H.

Hail, a violent Shower thereof — — 16
Hague, an Account of the Agitation of the Water there *Nov.* 1, 1755 — — — 396
——— an Account of an Earthquake felt there *Feb.* 18, 1756 — — — 544, 545
Hales (Stephen) D. D. his Account of the great Benefit of blowing Showers of freſh Air up through diſtilled Liquors — — — 312
——— ——— Thoughts on his new Method of Diſtillation, by the united Force of Air and Fire — 534
——— ——— his Letter concerning the Waters of the Holy Well, at *Malvern*, in *Worceſterſhire* — 459
——— ——— his Account of ſome Trials to cure the ill Taſte of Milk, and to ſweeten ſtinking Water 339
——— ——— Letter to him concerning an extraordinary Motion in the Water in the Lake *Ontario* 544
——— ——— Letter to him concerning the Toxicodendron of *Carolina* — — 157
——— ——— his Account of the great Benefit of Ventilators — — — — 332
Hamburgh, Account of the Agitation of the Water there *Nov.* 1. 1755 — — — 550
Haresfoot Trefoil, Account of that Plant — 844
Harriſon (Rev. Mr. *John*) his Account of the Agitation of the Waters in *Cumberland*, *Nov.* 1. 1755 — 381
Hart (Cheney) M. D. his Account of the Cure of a paralytic Arm by Electricity — — 558
Hawkweed, Buſhey, Account of that Plant 846

Health,

Health, Inſtances of the Benefit of Ventilators in the Preſervation thereof — — — 332
Hearing, a Method to reſtore the ſame, when injured by an Obſtruction of the *Tuba Euſtachiana* — 213
Heat of melted Lead, not too great to be borne in the Stomach without immediate Death — — 480
Heath, Fine-leaved, Account of that Plant — 829
——— *Lowdutch*, or *Bezom*, D° — — *ibid.*
Heberden, (Dr. *Wm.*) Letter to him concerning the Earthquake at *Madeira*, *Nov.* 1. 1755 — 432
Hée (*Chriſtianus*) his Eſſay on the Preſſure of Weights, in the Motion of Machines — — 1
Hellebore, *Baſtard*, Account of that Plant — 851
——— *Marſh*, D° — — 851
Hemlock, *Long-leaved*, D° — — 823
——— *Water*, D° — — — 822
Henkel (*Tilman*) Eſq; Letter to him concerning the Earthquake, *Nov.* 1. 1755, at *Oporto* — — 418
Herb Paris, Account of that Plant — 831
——— *Woodrooffe*, D° — — 811
Herculaneum, Account of the late Diſcoveries there 109, 110, 112, 490
——— Artifice made uſe of to unroll the Manuſcripts found there — — 113
Hertfordſhire, Account of the extraordinary Agitation of the Water in ſeveral Ponds there — — 684
Hind Berry, Account of that Plant — — 834
Hipone (otherwiſe *Bonne*) in *Barbary*, extraordinary Currents there — — — — 638
Hiſtory, *Natural*, of the *Adriatic* Sea, an Account of that Work — — — — 585
Hodgſon (Mr. *John*) his Account of a Fiſſure in a Rock, near *Petworth*, in *Suſſex* — — 358
Holdſworth (Rev. Mr.) Extract of a Letter from him, relating to the Agitation of the Waters at *Dartmouth* 643
Holland, Account of an Earthquake felt there 544, 545
Hollis (*Thomas*) Eſq; Extract of Letters to him, concerning the late Diſcoveries at *Herculaneum* — 109, 490

Hondt (Mr. *De*) his Account of the Agitation of the Waters at the *Hague*, *Nov.* 1, 1755 — 396
Horn, *Monſtrous*, growing from the Throat of a Sheep 183
Horſes, Experiments made on their Arteries after Amputations — — — 36, 40
Horſe-mint, *Long-leaved*, Account of that Plant — 837
Horſe-tail, *Female*, D° —— ——— 806
——— *Water Milfoil*, D° ——— 851
Houſes in England, their Number in 1710 — 270
—— — ——— —— ——— in 1750 — 887
Hunſton, in *Norfolk*, Account of the Agitation of the Water there *Nov.* 1, 1755 — — 380
Hurricanes, a Deſcription of them — — 627
Huſk, a Diſeaſe, to which young Bullocks are ſubject, cauſed by Worms ——— —— 247
Huxham (*John*) M. D. his Letter concerning the Agitation of the Water in *Devonſhire* and *Cornwall*, *Nov.* 1. 1755 —— —— —— 371
——— ——— his Letter concerning the Caſe of a Man who ſwallowed melted Lead —— 483
——— ——— Part of a Letter from him, in relation to the Effects of Lightning at *Plymouth* —— 16
Hyde (*John*) Eſq; an Account of the Earthquake at *Boſton*, in *New England*, *Nov.* 18, 1755, communicated by him 439

I.

Jacobſon (*Theodore*) Eſq; an Account of the Effects of the Earthquake, *Nov.* 1, 1755, at *Oporto*, communicated by him — — — — 422
Jalabert (Monſ.) his Account of a continued Succeſſion of Earthquakes at *Brigue*, in *Valais* — — 616
Jamineau (*Iſaac*) Eſq; Extract of Five Letters from him, concerning the late Eruption of *Veſuvius* 24, 27, 28.
Japan, the Plant from whence the Varniſh, uſed there, is procured —— —— —— 162.
——— Manner of procuring that Varniſh — 163.

Ildfar-

Ildfarcombe, in *Devonſhire*, Account of an unuſual Agitation of the Sea there — — — 642
Immerſion of, a Star under the Moon, obſerved at *Diarbekir* 252
Impreſſion on a Stone, dug up at the Iſland *Antigua* 295
Increaſe of the People in Britain and Ireland, Letter concerning it — — — 877
Inhabitants of England, their Number — — 268
Inoculation, Query the actual State thereof, in the *Eaſtern* Countries — — — — 96
——— anſwered — — 104
——— practiſed by the *Georgians* — 108
——— Sir *Hans Sloane*'s Account of it — 516
Inſcriptions, Roman, an Attempt to explain Two of them, which were dug up at *Bath* — — 285
——— Conſiderations on Two, found on Pieces of Lead — — — 686
——— Account of one of them, found at *Malton*, in *Yorkſhire* — — — 69
——— Account of Four, found near *Wroxeter*, in *Shropſhire* — — — 196
Inſects, of the Polype Kind, remarkable ones, found in the Waters near *Bruſſels*, in *Flanders* — 248
Inſtances of the great Benefit of Ventilators, in the Preſervation of the Health and Lives of People, on board of Slave and other Tranſport Ships — 333
Inteſtines, Caſe of a Boy, who had a conſiderable Part of them forced out, by the Fall of a Cart — 238
Journal of the Weather in *Dublin* — 759
Iron Ore, Account of a Mountain thereof, in *Sweden* 30
Irregularities in the annual Motion of the Earth, Eſſay concerning them — — — 737
Irregularities of the Tides at divers Places in the Rivers *Thames* and *Medway* — — 523, 530
Irritability, an Account thereof, in the ſeveral Parts of Animals — — — 240
Iſoperimetrical Problems, Inveſtigation of a general Rule, for the Reſolution of them — — 4

Jupiter

Jupiter, the Irregularities of the annual Motion of the Earth, occaſioned by the Action of that Planet — 737
——— D° — — in the Obliquity of the Ecliptic — 744
——— *its Satellites*, Obſervations of their Eclipſes, made at *Liſbon* — — — — 48

K.

Kent, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — — 360
Kidney-wort, Account of that Plant — — 832
Kidney-vetch, D° — — — — 842
Kilpatrick, (Sir *Tho.*) Bart. his Account of the extraordinary Agitation of the Waters, in a ſmall Lake at *Cloſeburn*, in the Shire of *Dumfries* — — — 521
Kingſale, in *Ireland*, Account of the Agitation of the Waters there *Nov.* 1. 1755 — — 391, 393
Knee joints, an Account of Two ſingular Caſes of diſeaſed ones, ſucceſsfully treated — — — 452
Knotted Parſley, Account of that Plant — 821
Knotted Trefoil, with oblong Heads, D° — 844
——— ——— *with round Heads*, D° — — *ibid.*

L.

Ladies Finger, Account of that Plant — 842
——— *Mantle*, D° — — — 812
——— *Smock*, D° — — — — 839
——— *Traces* D° — — — — 850
Lambert (*Edward*) the Porcupine Man, Account of him 22
Land Breezes, how occaſioned — — — 146
Latham (Mr.) his Account of the Earthquake at *Liſbon*, *Nov.* 1, 1755 — — — 411
Lathyrus, *Wild*, Account of that Plant — 842
Laterman (Mr. *James*) Two Letters of his, concerning the Effects of the Agaric of the Oak — — — 36
Latitudes of ſeveral remarkable Places in the Eaſt 252
Lava, attending the Eruption of Mount *Veſuvius*, its Properties — — — — 25
Lead, *Melted*, Caſe of a Man, in whoſe Stomach a conſiderable Quantity was found — — — 477

Lead,

Lead, Melted, extracted from the Stomach of Dogs, and other Animals — — — — 480
Lead Mines, in *Derbyſhire*, an Account of the Earthquake, *Nov.* 1, 1755. as felt in them — 398
Leiceſterſhire, Account of ſome of the more rare *Engliſh* Plants obſerved there — — 803
Lettuce, Wild, Account of that Plant — 845
Leyden, an Account of the Agitation of the Waters there on the 1ſt of *Nov.* 1755 — — 397
Liege, Account of an Earthquake felt there — 893
Life, the Probability thereof, at *London*, Method of conſtructing a Table thereof — — 167
Lightning, the Effects thereof in the *Daniſh* Church, in *Wellcloſe-ſquare* — — 298
——— ——— ——— at *Darking*, in *Surry* 309
——— ——— ——— on the Great Hulk at *Portſmouth-Dock* — — — 16
——— ——— ——— at *Newbury*, in *New England* — — — 307
Lightning conducted along a ſmall Wire, without doing any Damage to a Building, ſo far as the Wire extended *ibid.*
Lilley of the Valley, Account of that Plant — 827
Lime, Unſlacked, its Action on volatile alcaline Salt 222
Liquor Amnii contributes to nouriſh the Fœtus, which ſwims therein — — — 254
Liquors, while diſtilling, the Benefit of blowing Showers of freſh Air up through them — — 312
Liſbon, Account of the Earthquake there *Nov.* 1, 1755 402, 409, 411
——— Obſervations thereon, made at *Colares*, about 20 Miles from that City — — 413
——— Account of the Earthquake there, in the Year 1531, from *Paulus Jovius* — — 402
——— Obſervations of the Eclipſes of the Satellites of *Jupiter*, made there — — — 48
Lives, Annuities thereon, a Table of their Values — 892
Loch Lommond, in *Scotland*, Account of the Agitation of the Water there *Nov.* 1, 1755 — — 389

Loch Neſs, in *Scotland*, Account of the Agitation of the Water there *Nov.* 1, 1755 — — 387
Locke (John) Eſq; his Tranſlation of a Letter, concerning the Books and antient Writings dug out of the Ruins of an Edifice near *Herculaneum* — — 112
Long-leaved Chickweed, Account of that Plant — 832
——— *Horſe-mint*, Dº — — 837
Looſe Strife, Dº — — — 814
Lungwort, Dº — — — 857
Lupi Crepitus, See *Lycoperdon*.
Lycoperdon, a Letter concerning its Uſe, in ſtopping Blood after Amputations — — — 39, 40
——— Experiments made therewith, upon the Arteries of Horſes — — — 36
Lyttleton (Rev. Dr. *Charles*) Letter to him concerning the Agitation of the Waters in *Cornwall* on the 1ſt of *Nov.* 1755 — — — — 373
——— ——— ——— an Eſſay on the Waters of the Holy Well at *Malvern*, in *Worceſterſhire*, communicated by him — — — — 459

M.

Macclesfield (Earl of) ſurpriſing Agitation of the Waters at his Seat at *Shirburn-Caſtle*, in *Oxfordſhire* — 368
——— ——— Letter to him on the Advantage of taking the Mean of a Number of Aſtronomical Obſervations — — — — 82
——— ——— Letter to him concerning the Impreſſion on a Stone, dug up in the Iſland of *Antigua* 297
——— ——— Letter to him concerning the Irregularities of the Tides, in the River *Thames*, in *Feb.* 1756 533
——— ——— Letter to him containing an Account of the more uncommon *Engliſh* Plants, obſerved in *Leiceſterſhire* — — — 803
——— ——— Letter to him concerning the Method of conſtructing a Table of the Probabilities of Life at *London* — — — — 167

Macclesfield (Earl of) Letter to him concerning the Swallowing of melted Lead — — 480
Machines, the Preſſure occaſioned by Weights, in their Motion — — — — 1
Madeira, Account of the Earthquake there *Nov.* 1, 1755 432, 435
Madrid, Effects of the Earthquake, of *Nov.* 1. 1755, there 423
Maeſtrecht an Account of the Earthquakes felt there 663, 545, 893
Maiden Hair, Account of that Plant — 855
Malignant Fevers, Account of thoſe that raged at *Rouen* in the Years 1753 and 1754 — — 49
Malt Tax, the Amount thereof from the Year 1746 to the Year 1753 — — — 273
Malton, in *Yorkſhire*, Account of a *Roman* Inſcription found there, in the Year 1753 — — 69
Malvern, in *Worceſterſhire*, an Eſſay on the Waters of the Holy Well there — — 459
Manilla, an Account of that Iſland, and of an Earthquake there — — — — 458
Mankind, Query, whether the Plurality of Wives is favourable to the Increaſe of them — 96
——— ——— anſwered — 103
Mantle, *Ladies*, Account of that Plant — 812
Maps of the Turkiſh Dominions, Query concerning them 96
——— — ——— ——— anſwered — 105
Margate, Account of the Earthquake felt there *Feb.* 18, 1756 — — — 579
Marſeiles, in *France*, an extraordinary Flow of Waters there — — — 637
Marſh Hellebore, Account of that Plant — 851
Marſh Saxifrage, Dº — — — 833
Maſcali, Extract of a Letter from the Magiſtrates thereof, concerning a late Eruption of *Mount Ætna* — 209
Matthew (Mr. *Edward*) his Letter concerning the Sinking of a River near *Pontypool*, in *Monmouthſhire* 547

Matty (Matthew) M. D. an Account of ſome Aſtronomical and Phyſical Obſervations, made in *Aſia*, communicated by him — — — 251
——— ——— —— Letter to him from Monſ. *la Condamine* — — — 622
——— ——— —— Account of the Earthquake at *Oporto*, *Nov.* 1, 1755, communicated by him 422
——— ——— —— his Tranſlation of ſome Obſervations, made on the Brimſtone-Hill, in the Iſland of *Guadelupa* — — — 564
——— ——— —— Queries ſent by him to a Friend at *Conſtantinople* — — — 96
Matweed, *Small*, Account of that Plant — 809
Mauduit (Mr. *Iſrael*) his Obſervations upon an *American* Waſps-Neſt — — — 504
May-lilly, Account of that Plant — 827
Mazeas, (Abbé) his Letter concerning the Toxicodendron of *Carolina* — — — 157
——— ——— his Letter concerning the Revival of the ancient Method of Painting — 652
Meadow Saxifrage, Account of that Plant — 821
Medicated Urine, a Solvent for the Stone in the Bladder 900
Medick, *Vetch-ling*, Account of that Plant — 843
Mediterranean Sea, Obſervations on certain Currents there 634
Medway, Irregularities of the Tides therein, in *Feb.* 1756 523
Melted Lead, Caſe of a Man who ſwallowed a conſiderable Quantity thereof — — 477
——— —— the Heat thereof, not too great to be borne on the Stomach, without immediate Death — 480
——— —— extracted from the Stomach of Dogs, and other Animals — — *ibid.*
——— —— Letter from Dr. *Huxham*, concerning the Man who ſwallowed melted Lead — 483
Men, Query, if not exceeded, in Number, by the Women in the *Eaſtern* Countries — 69
—— ———, anſwered — — 101

Mequinez,

Mequinez, Account of the Earthquakes there on the 1ſt and 18th of *Nov.* 1755 — — 430, 431
Microſcopical Obſervations on the Production of Animalcules, in Infuſions made with boiling Water — 553
Milan, an Account of ſome Earthquakes felt there 613
Miles (Henry) D. D. a Letter from him, containing the State of the Thermometer on *Feb.* 8 and 9, 1755 43
Milk, Method of curing the ill Taſte thereof — 339
Millepedes, Obſervations on the Production of Animalcules, by an Infuſion of them in boiling Water — 554
Miller (*Philip*) his Letter concerning the Toxicodendron of *Carolina* — — — 161
Milles (*Jeremiah*) D. D. an Account of an unuſual Agitation of the Sea at *Ildfarcombe*, in *Devonſhire*, communicated by him — — 642
——— ——— an Account of the like at *Dartmouth*, communicated by him — — 643
Millet, *Cyperus Graſs*, Account of that Plant — 808
Mills Mr. *Henry)* his Letter, containing an Account of the Agitation of the *Thames*, near *Rotherhithe*, *Nov.* 1, 1755 — — — 361
Mines, in *Derbyſhire*, an Account of the Earthquake, *Nov.* 1, 1755, as felt in them — — 398
Mineral Waters, an Eſſay on thoſe at *Malvern*, in *Worceſterſhire* — — — 459
Mitchel (Capt. *Wm.*) his Letter concerning the Irregularity of the Tides on *Feb.* 12, 1756 — 532
Moneywort, Account of that Plant — 815
Monmouthſhire, Account of the Sinking of a River there 547
Moon, the Immerſion of a Star under her, obſerved at *Diarbekir* — — — 252
——— *her Nodes*, the Inequalities produced by the Poſition of them, in the Preceſſion of the Equinoxes 714
——— *her Apogee*, Dº — — 722
——— *Eclipſe thereof*, Obſervations on one — 265
Moonwort, Account of that Plant — — 854

Morocco,

Morocco, Account of an Earthquake felt there *Nov.* 1. 1755 — — — 431
Mortality, *Bills of*, Objections to them anſwered — 888
Moſchatell, *Tuberous*, D° — — 831
Mountain of Iron Ore, in *Sweden*, Account thereof — 30
Mountains, Account of Two large Bodies of Snow which tumbled down from them — — 796
Mounts-Bay, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — 373
Mug-weed, Account of that Plant — — 853
Muſhroom, *Pepper*, D° — — 860
Muſk-wood, *Crowfoot*, D° — — 831
Muyſſon (Monſ.) his Account of the Earthquake at *Oporto* *Nov.* 1, 1755 — — — 422

N.

Nardus Indica, a graminous Plant — 253
Narrow-leaved buſhey Hawkweed, Account of that Plant 846
Naſſau, Remarks on Stones in that County, reſembling thoſe of the Giants Cauſey — — 581
Natural Hiſtory of the Adriatic Sea, an Account of that Work — — — 585
Navel-wort Account of that Plant — — 832
Needham (John) his Account of the Caſe of a Boy, who had a conſiderable Part of his Inteſtines forced out, by the Fall of a Cart — — — 238
Nep, or *Cat-mint*, Account of that Plant — 837
Netherlands, Account of an Earthquake felt in divers Parts of them on *Dec.* 26 and 27, 1755 — — 512
Nettis (John) M. D. his Account of the Method of obſerving the Configurations of the Particles of Snow 644
Neufchatel, in *Swiſſerland*, an Account of the Earthquakes there on the 1ſt and 9th of *Nov.* 1755 — 436
Newbury, in *New England*, Effects of Lightning there 307
New York, an Account of the Earthquake there *Nov.* 18, 1755 — — — — 443

Nichols

Nichols Frank, M. D. his Account of Worms in animal Bodies — — — — 246
Nicola (L.) his Account of the Agitation of the Waters at *Kingſale*, in *Ireland*, *Nov.* 1, 1755 — 391
Nightſhade, *Deadly*, Account of that Plant — 818
Nitre, how produced — — 253
Nodes of the Moon, the Inequalities produced, in the Preceſſion of the Equinoxes, by the Poſition of them 714
Norfolk, Account of the Agitation of the Waters in that County, *Nov.* 1, 1755 — — 380
Number of Houſes in *England*, in 1710 and 1750 270, 887
Number of People in *England* — — 268, 274
Nutation of the Earth's Axis, Eſſay concerning it — 704

O.

Oak, *Agaric thereof*, its Effects after Capital Operations in Surgery — — — 36, 93, 264
——— ——— Account of the Species of Plant, from which the Styptic, ſo called, is produced — 28
Oak Lungs, Account of that Plant — 857
Oat Graſs, *Red*, D° — — 810
Obliquity of the Ecliptic, the Variations occaſioned therein, by the Actions of *Jupiter* and *Saturn* — 744
——— — — ——— D° by the Poſition of the Moon's Apogee — — — 722
——— — — ——— D° by the Force of the Sun 718
Obſervations, *Aſtronomical*, the Advantages of taking a Mean of a Number of them — — 82
——— ——— *Aſtronomical and Phyſical*, Account of ſome made in *Aſia* — — — 251
——— ——— on the Brimſtone-Hill in the Iſland of *Guadelupa* — — — — 564
——— ——— on the Earthquake at *Liſbon*, *Nov.* 1, 1751, made at *Colares*, about 20 Miles from that City 413
——— ——— *Microſcopical*, on the Production of Animalcules in Infuſions made with boiling Water — 553
——— ——— on an Eclipſe of the Moon — 265

Obſer-

Obſervations on the Eclipſes of the Satellites of *Jupiter*, made at *Liſbon* — — — 48
Oil, Sweet, Account of its curing ſome dropſical Caſes 46
Old-ſtreet, London, Account of the Waters in *Peerleſs Pool*, near that Place, *Nov.* 1, 1755 — — 362
Old Wife, the Portraiture of a Fiſh, ſo called, impreſſed on a Stone, dug up in the Iſland of *Antigua* — 295
— — —— Mr. *Arthur Pond*'s Deſcription thereof — 297
Oliver (Wm.) M. D. Letter to him, with an Account of ſome Caſes of Dropſies cured by ſweet Oil — 46
Ontario, Lake, an extraordinary Motion in the Waters thereof — — — 544
Oporto, Account of the Earthquake, *Nov.* 1, 1755, as felt there — — — 418, 419, 421, 422
Orchis Butterfly, the leſſer, Account of that Plant — 850
Ore, Iron, Account of a Mountain thereof in *Sweden* 30
Orthoceratites, an Account of one — 672
Oſmund Royal, Account of that Plant — 854
Oxfordſhire, Account of the Agitation of the Waters at *Shirburn-Caſtle*, *Nov.* 1, 1755 — — 368

P.

Paderni (Camillo) his Account of ſome Diſcoveries at *Herculaneum* — — — 110, 490
Padua, an Earthquake felt there — — 615
Paice (Mr. *Joſeph*) Letter to him concerning the Earthquake at *Liſbon*, *Nov.* 1, 1755 — 424
Painting, Ancient Method of, revived by Count *Caylus* 652
—— —— —— — Obſervations thereon by Dr. *Parſons* — — — 655
Palmyrene Character, ſome reſembling ſuch, on the Reverſe of a *Parthian* Coin — — 593
Paper, a Kind thereof, formed by the *American* Waſps, to cover their Neſts — — 206
Paralytic Arm, Cure thereof by Electricity — 558
Parker (Lord Viſcount) his Account of the Agitation of the Waters at *Shirburn-Caſtle*, *Nov.* 1, 1755 368
Parker (Wm.) D. D. Account of an Earthquake at the *Hague*, communicated by him — — 544

Parnaſſus,

Parnaſſus, The Graſs of, Account of that Plant — 825
Parſley, Baſtard, D° — — 822
——— *Knotted*, D° — — — 821
——— *Purple-flowered*, D° — — *ibid.*
Parſnep, Water, D° — — 822
Parſons (James) M. D. his Tranſlation of a Diſſertation, concerning the Cancer of the Eyelids, Noſe, *&c.* called *Noli me tangere* — — — 186
——— ——— Two Letters to him, concerning the Earthquake at *Liſbon*, 1 *Nov.* 1755 — 402, 408
——— ——— his Remarks on a petrified Echinus, ſhewn to the *Royal Society*, by Dr. *Pococke* — 155
——— ——— an Account of the Revival of an ancient Method of Painting, tranſlated by him — 652
——— ——— his Obſervations on the above 655
——— ——— his Account of a Sheep, having a monſtrous Horn growing from its Throat — 183
——— ——— his Tranſlation of the Abbé *Mazeas*'s Letter, concerning Toxicodendron — 157
Parthian Coin, a Diſſertation concerning one — 593
Paul's Betony Account of that Plant — 807
Paulus Jovius, his Account of the Earthquake at *Liſbon* in 1531 — — — 402
Peaſe, Everlaſting, Account of that Plant — 842
Peerleſs Pool, near *Old-ſtreet*, *London*, Account of the Agitation of the Waters there, *Nov.* 1. 1755 — 362
Pennant (Tho.) Eſq; his Account of ſome *Fungitæ*, and other coralloid foſſile Bodies — — 513
Penny-wort, Account of that Plant — 832
Penſylvania, Account of Copper-Springs, lately diſcovered there — — — 648
——— an Account of the Earthquake felt there *Nov.* 1, 1755 — — — 444
Penzance, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — 375
People in Britain and Ireland, their Increaſe, Letter concerning it — — — 877.

People in England, their Number — — 268
Pepper, Muſhroom, Account of that Plant — 860
Peterſburgh, the Death of Profeſſor *Richman* there, occaſioned by the Electrical Power of the Clouds — 61
Peyſſonel (John Andrew) M. D. his Obſervations on the Currents of the Sea, at the Antiſles of *America* — 624
——— ——— ——— his Obſervations on the Brimſtone-Hill, in the Iſland of *Guadelupa* — 564
Phænomena of the Weather, concerning the Cauſe of them 124
Phænomenon of a topical oblong Cloud, from whence iſſued Flames, Rays, and fiery Corruſcations, ſeen at *Conſtantinople* — — — — 119
Philips (Mr. *Richard)* his Letter concerning the Agitation of the Waters, near *Reading*, in *Berkſhire*, *Nov.* 1, 1755 365
Phyſical Obſervations, an Account of ſome made in *Aſia* 251
Pitfold (Mr. *James)* Letter to him concerning t Iff ects of Lightning at *Darking*, in *Surry* — 309
Plants, Catalogue of Fifty, from *Chelſea* Garden, for the Year 1745[5]4 — — — 78
——— Dº ——— ——— for the Year 1755 — 607
——— *Engliſh*, Account of ſome of the more uncommon, obſerved in *Leiceſterſhire* — — 803
Plummer (Mr.) Two Letters to him, concerning the Earthquake, *Nov.* 1, 1755, as felt at *Oporto* — 419, 421
Plurality of Wives, Query, if it be favourable to the Increaſe of Mankind — — — 96
——— — ——— ——— anſwered — 103
Plymouth, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — 371
——— Effects of Lightning on the Great Hulk there 16
Pococke (Richard) LL. D. ſhews a petrified Echinus, of a ſingular Kind, to the *Royal Society* — 155
Polypes, remarkable ones, found in the Waters, near *Bruſſels*, in *Flanders* — — — 248

Pond

Pond (Mr. *Arthur*) his Deſcription of *Antigua* — 297
—— —————— his Letter, concerning the Impreſſion on a Stone, dug up in the Iſland of *Antigua* — 295
Pontypool, in *Monmouthſhire*, Account of the Sinking of a River near that Place — — — 547
Porcupine Man, Account of him — — 22
Porter (James) Eſq; his Communication of ſome Aſtronomical and Phyſical Obſervations, made in *Aſia* — 251
—— ——— his Account of ſeveral Earthquakes lately felt at *Conſtantinople* — — 115
—— ——— his Anſwer to ſome Queries, ſent by Dr. *Matty*, F. R. S. to a Friend — — 97
Portſmouth, ſurpriſing Agitation of the Waters there *Nov.* 1, 1755 — — — — 351
Preceſſion of the Equinoxes, Eſſay concerning it — 704
———— — — ———— how far occaſioned by the Action of the Sun — — — 709
———— — — ———— the Inequality thereof, depending on the Poſition of the Moon's Nodes — 714
———— — — ———— D° —— of the Poſition of the Moon's Apogee — — 722
Preſſure of Weights, in the Motion of Machines, conſidered — — — — 1
Prince (Mr.) his Account of an unuſual Agitation of the Sea, at *Ildfarcombe*, in *Devonſhire* — 642
Pringle (*John*) M. D. Letter to him concerning the Agitation of the Waters, in a ſmall Lake at *Cloſeburn*, in the Shire of *Dumfries* — — 521
—— ——— —— Account of the Agitation of the Waters near *Chevening*, in *Kent*, *Nov.* 1, 1745, communicated by him — — 360
—— ——— —— Account of the Agitation of the Waters at *Loch Neſs*, in *Scotland*, *Nov.* 1, 1755, communicated by him — — 387
—— ——— ——— an Account of the Agitation of the Waters in *Scotland* and at *Hamburgh*, communicated by him — — — 550

Pringle (*John*) M. D. Account of the Agitation of the Waters at *Loch Lommond*, *Nov.* 1, 1755, communicated by him — — 389
——— ——— ——— his Letter concerning the Earthquakes felt at *Bruſſels* — — — 546
——— ——— ——— Account of the Earthquake felt at *Glaſgow* and *Dumbarton*; and of a Shower of Duſt falling on a Ship between *Shetland* and *Iceland* — 509
——— ——— ——— an Account of an Earthquake felt on the Coaſt of *England*, between *Margate* and *Dover*, communicated by him — — 579
——— ——— ——— Account of the Sinking of a River near *Pontypool*, in *Monmouthſhire*, communicated by him — — — — 547
Printing-Houſe at Conſtantinople, Query concerning it 96
——————————— ——— anſwered — 105
Probabilities of Lives, at *London*, concerning the Method of conſtructing a Table of them — 167
——— — ——— — ——— a Table of them — 181
Problems, *Iſoperimetrical*, Inveſtigation of a general Rule of the Reſolution of them — — 4
Pultney (*Richard*) Account of ſome of the more rare *Engliſh* Plants, obſerved in *Leiceſterſhire* — 803
Purple-flowered Baſtard-Parſley, Account of that Plant 821
——— ——— *Money-wort*, Dº — — 815
Pye (Mr. *Wm.*) his Letter, concerning the Iſland of *Manilla*; and of an Earthquake and Eruption there 458

Q.

Quantities of Rain fallen in *Antigua* for Four Years 295
Queries, concerning the *Eaſtern* Parts — 69

R.

Rain, *the Quantity of*, fallen at *Antigua* in Four Years 295
Rampions, *with ſcabious Heads*, Account of that Plant 849
Ramſons, Dº — — — — 826
Ranby (Mr.) Account of Inoculation, given by Sir *Hans Sloane*, Bart. to him, in the Year 1736 — 516
Rape, *Broom*, Account of that Plant — 838

Raſp-

Raſpberry, Account of that Plant — — 834
Reading, in *Berkſhire*, Account of the Agitation of the Waters, near that Place, *Nov.* 1, 1755 — 365, 367
Red Mint, Account of that Plant — — 837
Refractions, leſs in the *Eaſt* than in *Europe* — 253
Reſolution of Iſoperimetrical Problems — 4
Richman (*George William*) Account of his Death — 61
Rigid-leaved Bell-flowers, Account of that Plant — 815
River, *the Sinking of one*, an Account thereof — 547
Robertſon (Mr. *John*) his Account of the ſurpriſing Agitation of the Waters at *Portſmouth*, *Nov.* 18, 1755 351
Rochford, in *Eſſex*, Account of the Agitation of the Waters there, *Nov.* 1, 1755 — — 364
Rock, Account of a Fiſſure in one near *Petworth*, in *Suſſex* 358
Rock-Creſs, Account of that Plant — 839
Rock-Hair, D° — — — — 858
Rocket, *Baſe*, D° — — — 833
Rod, *Golden*, D° — — — 848
Roman Inſcriptions, an Attempt to explain Two of them, which were dug up at *Bath* — — 285
——— ——— Account of One, found at *Malton*, in *Yorkſhire* — — — — 69
——— ——— Aceount of Four, found near *Wroxeter*, in *Shropſhire* — — — 196
Roſe, *Burnet*, Account of that Plant — — 834
Rotherhithe, Account of the Agitation of the *Thames*, near that Place, *Nov.* 1, 1755 — — — 361
Rouen, an Account of the Malignant Fevers that raged there in the Years 1753 and 1754 — — 49
Royſton (Right Hon. Ld. Viſcount) Account of the Earthquakes that happened in *Barbary*, *Nov.* 1, 1755, communicated by him — — — 428, 431
Ruſſell (*Alex.*) M. D. his Account of Four undeſcribed Fiſhes of *Aleppo* — — — 445
Rutherforth (*Tho.*) D. D. his Account of the Agitation of the Waters in ſeveral Ponds in *Hertfordſhire* — 684

Rutty

INDEX.

Rutty (John) M. D. his Account of the Copper-ſprings lately diſcovered in *Penſylvania* — 648

S.

Saccheti (John Mendez) M. D. his Account of the Earthquake at *Liſbon*, *Nov.* 1, 1755 — 409
Saſſe, Account of the Earthquake there, *Nov.* 1, 1755, 430
Sage, Wood, Account of that Plant, — 836
Salle, Account of the Earthquake there, *Nov.* 1, 1755, 430
Salt, Common, Method of making it ſooner, cheaper, and better — — — 330
Salt, Volatile Alcaline, Effects of unſlacked Lime thereon 222
Sanicle, Yorkſhire, Account of that Plant — 808
Sarjon Hills, Account of the Earthquake there, *Nov.* 18, 1755 — — — — 431
Satellites of Jupiter, Obſervations of their Eclipſes made at *Liſbon* — — — 48
Saturn, the Irregularities in the annual Motion of the Earth, occaſioned by that Planet, — — 737
——— D° in the Obliquity of the Ecliptic — 744
Satyrion, Butterfly, Account of that Plant — 849
Saxifrage, Great Burnet, D° — — 824
——— *Engliſh Marſh*, D° — — 833
——— *Meadow*, D° — — 821
——— *Golden*, D° — — — 831
Scabious, Hairy Sheep's, D° — — 849
Schloſſer (John Albert) M. D. Extracts of Two Letters to him, concerning the Effects of the Agaric of the Oak 36
——— ——— ——— ——— his Experiments of the Action of unſlack'd Lime on volatile alcaline Salt — 222
Scotland, an Account of the Agitation of the Waters there *Nov.* 1, 1755 — — — 550
Scott (George Lewis) Eſq; Letter to him, concerning the preſent Increaſe of the People in *Britain* and *Ireland* 877
——— ——— ——— ——— D° concerning the Number of People in *England* — — — 268

Sea

Sea Breezes, how occaſioned — — 146
Sea Gillyflower, Account of that Plant — 825
Sea Water, Some Obſervations concerning the Manner of making it freſh — — — 317
Seleucia, in Syria, its Latitude — — 252
Senſibility, an Account thereof in ſeveral Parts of Animals 240
Sheep, Account of One having a monſtrous Horn growing from his Throat — — — — 183
Sheerneſs, Irregularities of the Tides there in *Feb.* 1756 523
Shepherd's Purſe, Account of that Plant — 839
——— *Rod*, D° — — 811
Shining, or *Stone Doves-foot Cranes-bill*, D° — 840
Ship, Account of a Shower of Duſt falling on one — 509
Ships, Inſtances of the Benefits of Ventilators on board of them, in the Preſervation of Health and Life — 332
Shirburn Caſtle, in Oxfordſhire, Surpriſing Agitation of the Water there *Nov.* 1, 1755 — — 368
Short (James) M. A. Letter to him concerning the extraordinary Alteration in the Baths of *Toplitz*, in *Bohemia*, *Nov.* 1, 1755. — — — 395
Shower of Duſt, Account of One falling on a Ship, between *Shetland* and *Iceland* — — — 509
Showers of freſh Air, the Benefit of blowing them up thro' diſtilling Liquors — — 312
Simon (James) his Journal of the Weather in *Dublin*, for the Year 1753 — — 759
Simpſon (James) Eſquire, Letter to him concerning the Agitation of the Water at *King ſale*, in *Ireland*, *Nov.* 1, 1755 — — — 394
——— (Mr. *Thomas*) his Inveſtigation of a general Rule for the Reſolution of Iſoperimetrical Problems — 4
——— ——— ——— his Letter concerning the Advantage of taking a Mean of a Number of aſtronomical Obſervations — — — 82
Sinking of a River, an Account thereof — — 547

Skin, Diſtempered, Supplement to the Account thereof, publiſhed in theſe Tranſactions, N° 424 — — 21
Sloane (Sir *Hans*) Baronet, Catalogue of Plants for the Year 1755, by his Direction — — 78
—— —— —— —— Do for 1755 — 607
—— —— —— —— his Account of Inoculation 516
Smyrna, an Earthquake felt there — — 117
Snakeweed, Account of that Plant — — 830
Snow, an Account of the Fall of vaſt Heaps thereof, from the Mountains — — — 796
Speedwell, Male, an Account of that Plant — 807
Speedwell, Narrow-leaved, D° — *ibid.*
Spleenwort, Rough, D° — — 854
Springfield (*Charles*) M. D. Account of his Treatiſe on the *Carlſbad* Waters, in *Bohemia* — 895
Spry (Mr. *Edward*) his Account of the Caſe of a Man, who died of the Effects of the Fire at *Eddyſtone* Light-houſe 477
—— —— —— a remarkable Caſe of a morbid Eye, communicated by him — — 18
Spurge Laurel, Account of that Plant — 830
Squire (*Samuel*) D. D. Letter to him concerning the extraordinary Agitation of the Waters in *Hertforſhire* 684
Star of the Earth, Account of a Plant ſo called 812
Steplin (Father *Joſeph*) his Account of the extraordinary Alteration in the Baths of *Toplitz*, in *Bohemia*, *Nov.* 1, 1755 — — — 395
Stevenſon (Dr. *John*) a Letter from him, with an Account of an extraordinary Agitation of the Waters in a ſmall Lake at *Cloſeburn*, in the Shire of *Dumfries* — 521
—— —— —— Letter to him, concerning the Agitation of the Water at *Loch Neſs*, in *Scotland*, *Nov.* 1, 1755 — — — 387
Stiles (Sir *Francis Hoſkins Eyles*) Bart. Extract of Five Letters to him, concerning the late Eruptions of *Veſuvius* 24, 27, & 28
Stinking Water, Method of ſweetening thereof — 313
—— —— Trials of that Kind — — 339

Stone

Stone in the Bladder, diſſolvable by the *Carlſbad* Waters in *Bohemia* — — — 895
——— — — — D° by medicated Urine — 900
Stone Doves-foot Granes-bill, Account of that Plant — 840
Stone, Account of an Impreſſion upon One, found in *Antigua* — — — — 295
Stone Parſley, Baſtard, Account of that Plant — 822
Stones, a Shower of them, thrown up by Mount *Ætna* 209
Strawberry, Barren, Account of that Plant — 834
Styptic, Effects of the Agaric of the Oak, — 36
——— Account of the Species of Plant, from which the Agaric, uſed as ſuch, is prepared — 28
——— Effects of the Powder of the Lycoperdon 36, 38
Sun, the Force of his Action on the equatorial Parts of the Earth — — — 704
——— D° on the mean Preceſſion of the Equinoxes — 709
——— D° on the Obliquity of the Ecliptic — 718
Surry, the Southern Parts thereof, Surpriſing Agitation of the Waters there *Nov.* 1, 1755 — 1353
Suſſex, D° — — — *ibid.*
Swanzey, D° — — — 379
Sweden, Account of a Mountain of Iron Ore there — 30
Sweet-ſmelling Flag, Account of that Plant — 827
Swinton (John) M. A. his Diſſertation on a *Parthian* Coin 593
Swiſſerland, an Account of an Earthquake there *Nov.* 24, 1755 — — — 511
Sykes (———) D. D. Letter to him, concerning the Agitation of the Water at *Rochford*, in *Eſſex*, *Nov.* 1, 1755 364

T.

Taberg, in *Sweden*, Account of a Mountain of Iron Ore there — ——— ——— 30
Table of the Probabilities of Lives in *London*, by Dr. *Brackenridge* ——— ——— 181
——— of the Values of Annuities, according thereto 892
Tangier, Account of the Earthquakes there on the 1ſt and 18th of *Nov.* 1755 ——— 429, 432

Tapping, Account of the Succeſs of ſome Experiments of injecting Claret, &c. into the Abdomen, after the Operation —— —— —— 485
Taſſo, Account of the Earthquake there *Nov.* 18, 1755 432
Teaſel, *Small-wild*, Account of that Plant — 811
Tea Tree to be very probably found in *Carolina*, if ſearched for by Perſons of Skill —— —— 165
Tempeſt (*Wm.*) Eſq; Extract of a Letter to him, concerning the Agitation of the Water at *Cranbrook*, in *Kent*, *Nov.* 1, 1755 —— —— — 360
Tetuan, Account of the Earthquakes on the 1ſt and 18th of *Nov.* 1755 —— —— 428, 432
Thames, Account of the Agitation thereof *Nov.* 1, 1755 361
—— Irregularities of the Tides therein, in *Feb.* 1756 523, 530
Theory of the Irregularities in the annual Motion of the Earth —— —— —— 737
—— of the Preceſſion of the Equinoxes, and the Nutation of the Earth's Axis —— —— 704
Thermometer, State thereof on *Feb.* 8 and 9, 1755 43
Thiſtle, *Soft and gentle*, Account of that Plant — 847
—— *Woolly-headed*, D° — — 847
Thompſon (Capt.) his Account of the Benefit of Ventilation on board a Ship, in which were near 200 Men for almoſt a Year —— —— — 334
Thornhill (Mr. *Wm.*) his Account of the Succeſs of Agaric in Amputations —— —— 264
Thrift, Account of that Plant —— 825
Throat-wort, *Little*, D° —— —— 817
Thunder Shower, how produced —— 144
Tides, *Irregularities of them*, in the Rivers *Thames* and *Medway*, in *Feb.* 1756 —— 523, 530
Tom (Mr. *Henry*) his Account of the Agitation of the Water at *Kingſale*, in *Ireland*, *Nov.* 1, 1755 — 393
Tomlinſon (Rev. Mr.) his Letter, concerning the Agitation of the Waters at *Rochford*, in *Eſſex*, *Nov.* 1, 1755 364
Toplitz, in *Bohemia*, an Account of the extraordinary Agitation in the Baths there *Nov.* 1, 1755 — 395

Tormentil-Cinquefoil, Account of that Plant — 835
——— *Creeping* D° — — *ibid.*
Toxicodendron, of *Carolina*, Two Letters concerning it 157, 161
——— its Uſe in Painting and Dyeing 159
——— if the Species of Plant from which the Inhabitants of *Japan* procure their Varniſh 162, 867
——— its poiſonous Qualities — 165
——— found alſo in *Virginia* and *New England* — — — 166
Trefoil, *Dwarf*, Account of that Plant — 843
——— *Knotted*, *with oblong Heads*, D° — 844
——— *Hares-foot*, D° — — *ibid.*
Trembley (Mr. *Abraham*) Letter to him concerning the Agitation of the Water at *Leyden*, *Nov.* 1, 1755 — 396
——— — ——— an Account of Earthquakes at *Brigue* in *Valais*, communicated by him — — 511, 616
——— — ——— Letter to him concerning the Earthquake felt at *Geneva*, the 9th of *Nov.* 1756 — 438
——— — ——— an Account of the late Earthquakes felt at *Maeſtricht*, &c. communicated by him 663, 893
——— — ——— his Account of a Work, containing An Eſſay towards the Natural Hiſtory of the *Adriatic* Sea — — — — 585
——— — ——— Letter to him concerning an Earthquake felt in divers Parts of the *Netherlands*, on the 26th and 27th of *Dec.* 1755 — — 512
——— — ——— D° concerning the like, on the 18th of *Feb.* 1756 — — — 545
——— — ——— his Remarks on the Stones in *Naſſau*, *Treves*, &c. reſembling thoſe of the Giants Cauſey 581
——— — ——— Letter to him concerning Two Earthquakes felt at *Turin*, and other Parts of *Italy* — 612
Treves, Remarks on Stones in that Territory, reſembling thoſe of the Giants Cauſey — — 581
Trial to cure the ill Taſte of Milk, and to ſweeten ſtinking Water — — — 339
Triple Ladies Traces, Account of that Plant — 850

True Acorus, Account of that Plant —— 827
True Love, or *One Berry*, D° — 831
True Paul's Betony, D° —— —— 807
Tuba Euſtachiana, Method of reſtoring the Hearing, when injured by an Obſtruction therein — 213
Tuberous Moſchatell, Account of that Plant — 831
Turin, an Account of Two Earthquakes felt there 612
Turkiſh Dominions, Queries concerning them, and their Anſwers —— —— 96 *to* 107

V.

Valais, Account of an Earthquake there *Nov.* 14, 1755, 511
—— Account of a continued Succeſſion of them at *Brigue*, in that Territory — — — 616
Values of Annuities for ſingle Lives, a Table of them 891
Vapours, their Aſcent, concerning the Cauſe thereof 124.
—— Experiments proving them to be electrified 151
—— the Quantity augmented by Wind — 150
Varniſh, that of *Japan*, Attempt to aſcertain the Tree that yields it — — — 162, 866
—— —— —— Manner of procuring it — 163
Vautravers (Monſ. *De*) his Account of the Earthquakes at *Neufchatel*, in *Swiſſerland*, *Nov.* 1 and 9, 1755 436
Ventilators, the Benefit ariſing from their Uſe — 332
Venus Looking glaſs, the Leſſer, Account of that Plant 817
Verne (Monſ. *De*) his Letter concerning the late Earthquakes at *Maeſtricht* — — — 663
Veſuvius, Mount, Account of the late Eruption thereof 24
Vetch, Chickling, Account of that Plant — 843
—— *Kidney*, D° —— —— 842
Vetchling, Medick, D° —— —— 843
Violet, Corn, D° —— —— 817
—— *Water*, D° — — — 814
D'Ulloa (*Don Antonia*) his Account of the Earthquake at *Cadiz*, 1 *Nov.* 1755 — — — 427
Univerſal Deluge, Reaſons for the Belief thereof — 678
Unrolling, Method thereof, uſed by Father *Antonio*, to read the ancient Manuſcripts, dug out of the Ruins of an Edifice near *Herculaneum* — — 113

Unſlacked

INDEX.

Unſlacked Lime, its Effects on volatile alcaline Salt 222
Utrecht, Account of an Earthquake there *Feb.* 18, 1756 545

—— W.

Wales, Account of the Charr Fiſh, found in *North Wales* 213
Wall (J.) M. D. his Eſſay on the Waters of the Holy Well, at *Malvern*, in *Worceſterſhire* — 459
Wall Penny-wort, Account of that Plant — 832
Walmeſley (Mr. *Charles*) his Two Eſſays, relating to Aſtronomy, addreſſed to Dr. *Bradley* — 700
Ward (John) LL. D. his Attempt to explain Two *Roman* Inſcriptions, dug up at *Bath* — — 285
—— —— —— Conſiderations of his, on Two Pieces of Lead with *Roman* Inſcriptions on them — 686
—— —— —— his Account of a *Roman* Inſcription, found at *Malton*, in *Yorkſhire* — — 69
—— —— —— his Account of Four ſuch, found near *Wroxeter*, in *Shropſhire* — — 196
Warner (Mr. *Joſeph*) his Communication, concerning the the Effects of Agaric of the Oak and of the Powder of the Lycoperdon, uſed as Styptics — 36
—— —— —— his Account of Two ſingular Caſes of diſeaſed Knee-joints, ſucceſsfully treated — 452
Warren (Mr. *Samuel*) his Letter, concerning the Earthquake felt on the Coaſt of *England*, between *Margate* and *Dover* — — — — 579
Warrick (Mr. *Chriſtopher*) his Account of the Succeſs of injecting Claret, *&c.* into the Abdomen after Tapping 485
Waſps-Neſt, an *American* one, ſome Obſervations thereon 205
Water, the Force of the Engine, for raiſing it by Fire, increaſed — — — — 312
Water Fern, Account of that Plant — — 854
—— *Gillover*, or *Gilloflower*, D° —— 814
—— *Hemlock*, D° —— —— 822
—— —— *Long-leaved*, D° — — 823
—— *Milfoil*, *Horſe tail*, D° — —— 851
—— *Pimpernel*, *Round-leaved*, D° — 818
—— *Speedwell*, D° — — — — 807

Water

Water Violet, Account of that Plant — — 814
Water Spout, how occaſioned —— 147
Water, Stinking, Method to ſweeten it —— 313
—— —— ſome Trials relating thereto — 339
Waters, their ſurpriſing Agitation on the 1ſt of *November*, 1755. See Agitation of the Waters.
Waters, at *Carlſbad*, in *Bohemia*, a Solvent for the Stone in the Bladder — — — — 895
Waters, Mineral, an Eſſay on thoſe at *Malvern*, in *Worceſterſhire* — — — — 459
Wathen (Mr. *Jonathan*) his Method of reſtoring the Hearing, when injured by an Obſtruction of the *Tuba Euſtachiana* — — — 213
Watſon (Robert) M. D. an Account of the late Diſcoveries of Antiquities at *Herculaneum*, communicated by him 490
—— —— — his Obſervations concerning them 504
Watſon (Mr. *William*) his Account of the Species of the Plant, from whence the Agaric, uſed as a Styptic, is prepared — — — 28
—— —— —— Letter to him concerning the Agitation of the Sea at *Antigua* — — — 668
—— —— —— Letter to him concerning the Caſe of a Man who ſwallowed melted Lead . — 483
—— —— —— his Account of a *Latin* Treatiſe, concerning the Waters at *Carlſbad*, in *Bohemia* — 895
—— —— —— Letter to him concerning the Cure of a paralytic Arm, by Electricity — 558
—— —— —— Letter to him concerning the Agitation of the Water in *Devonſhire* and *Cornwall*, *Nov.* 1. 1755 —— —— —— 371
—— —— —— Part of a Letter to him, in relation to the Effects of Lightning at *Plymouth* — 16
—— —— —— Account of ſome of the more rare Plants, obſerved in *Leiceſterſhire*, tranſmitted to him 803
Weather, *Journal thereof*, at *Dublin* — — 759
Weather, concerning the Cauſe of the Phænomena thereof 124

Webb (Phil. Carteret) Letters to and from him, concerning the ſurpriſing Agitation of the Waters, *Nov.* 1, 1755, in *Suſſex* and the Southern Parts of *Surry* 353, 357 & 358.
——— ——— Letter to him, concerning the Tree which yields Varniſh — — 866
Weights, their Preſſure in the Motion of Machines — 1
Wellcloſe-ſquare, Effects of Lightning at the *Daniſh* Church there — — — — 298
Wetſtein (the Rev. Mr.) Letter to him, concerning ſeveral Earthquakes lately felt at *Conſtantinople* —— 116
Wheat, the Quantity thereof conſumed in *England* 273
Whorts, or *Whortle Berries*, Account of that Plant 828
Whytt (Dr. *Robert*) his Account of an Earthquake, felt at *Glaſgow*; and of a Shower of Duſt falling on a Ship 509
Wife, Old, the Portraiture of a Fiſh ſo called, impreſſed on a Stone, dug up in the Iſland of *Antigua* — 295
——— —— Mr. *Arthur Pond*'s Deſcription thereof — 297
Wild Baſil, Account of that Plant — — 838
—— *Engliſh Daffodil*, D° — — 826
—— *Lathyrus, Great*, D° — — 842
Willow, Creeping Dwarf, D° — — 852
Willow Herb, Yellow, D° — — — 814
Wilmer (John) M. D. his Catalogue of Fifty Plants, from *Chelſea* Garden, for the Year 1754, — 78
——— —— —— D° for the Year 1755 — 607
Wilſon (Mr. *Benj.*) a Letter to him, concerning the Iſland of *Manilla*; and an Earthquake and Eruption there 458
——— ——— his Retraction of his former Opinion, concerning the *Leyden* Experiment — 682
Windermere Water, in *Cumberland*, Agitation thereof on *Nov.* 1, 1755 — — — 382
Window-lights, Number of Houſes in *England* and *Wales*, charged to that Tax in 1750 — — 887
Winds, concerning their Cauſe — 124, 135
——— augment the Quantity of aſcending Vapours 150
Wire, a ſmall one ſufficient to conduct Lightning through a Building, without Damage thereto — 309

Wives,

Wives, the Plurality thereof, Query, if it be favourable to the Increaſe of Mankind, and Anſwer — 96, 103
Wolfall (Mr.) his Account of the Earthquake at *Liſbon*, *Nov.* 1, 1755 — — — 402
Women, Query, if more numerous than Men in the *Eaſtern* Countries, and Anſwer — — 96, 103
Woodroofe, Herb, Account of that Plant — 811
Wood Sage, D° — — — 836
Woolwich, Irregularity of the Tides there in *Feb.* 1756 523
Worms, an Account of ſuch, in Animal Bodies — 246
Wright (Edw.) M. D. his Letter concerning a remarkable foſſile Body — — — 670
— — — D° concerning the Orthoceratites 672
Writings, Antient, dug up out of the Ruins of an Edifice, near the old City of *Herculaneum* — 112
Wroxeter, in *Yorkſhire*, Account of Four *Roman* Inſcriptions found there — — — 196

Y.

Yorkſhire, Conſiderations on Two large Pieces of Lead found there, with *Roman* Inſcriptions thereon — 686
Yorkſhire Sanicle, Account of that Plant — 808
Yarmouth, in *Norfolk*, Account of the Agitation of the Waters there *Nov.* 1, 1755 — — 380
Yellow-willow Herb, Account of that Plant — 814

ERRATA in Part. II. Vol. XLIX.

Pag. 77. Not. 2. for *Neuburg*, read *Neubrig*.
202. Not. 1. for lxx. read lxxv.
204. Not. 1. for *Monum*, read *Monm*.
468—477 wrong number'd, the intermediate Numbers being omitted.
468. Line laſt, for XLIV. read LXIV.
485. Line 3, for *Cupping*, read *Tapping*.
550. 8, for 1756, read 1755.
477. for LVI. read LXIV.
616, 622, 624. for CII. CIII. CIV. read XCII. XCIII. XCIV.